TECHNICAL DEPT.

AVIATION

The Oldest American Aeronautical Magazine

MAY 14, 1928 Issued Weekly PRICE 20 CENTS

Flight picture of a Waco 10 (Wright Whirlwind), with Charles W. Meyers at the stick.

VOLUME XXIV

NUMBER 20

Special Features

The Navy PN-12 Seaplane
The New Curtiss "Chieftain"
The Langley Field Maneuvers

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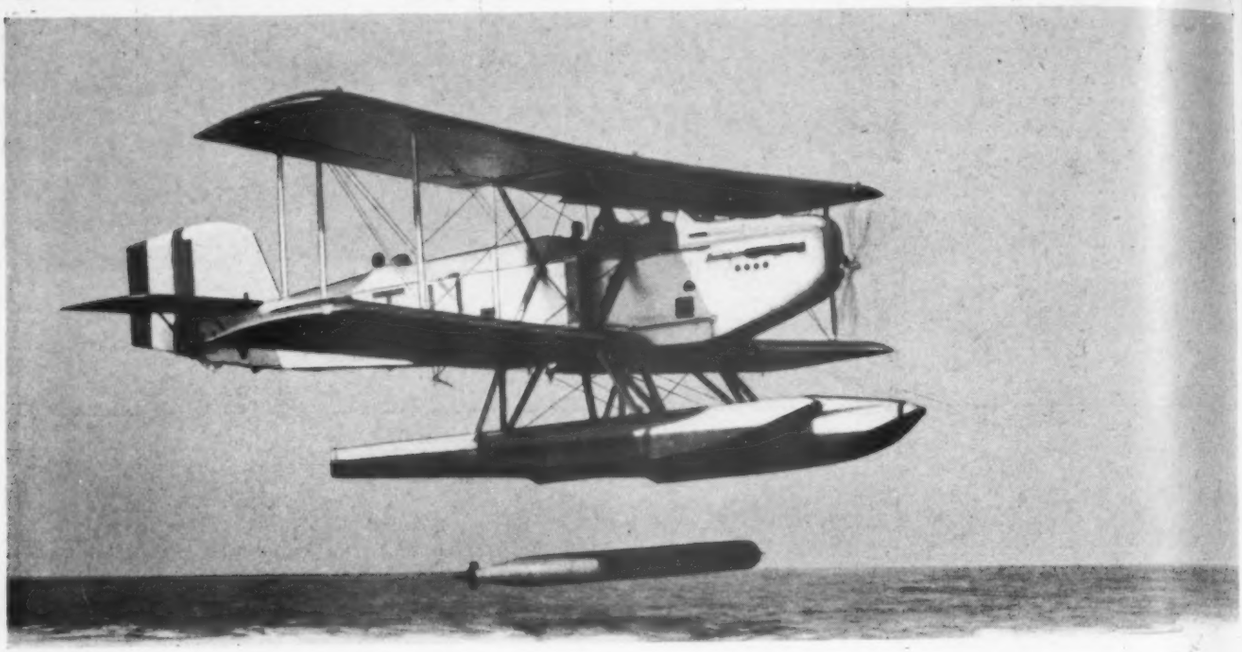

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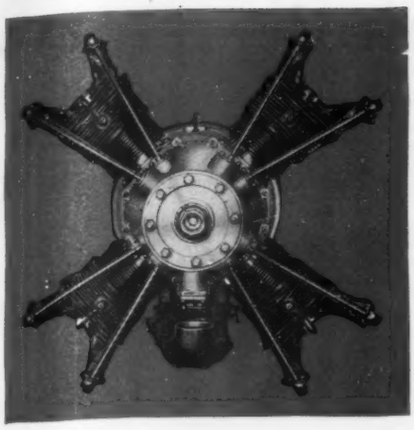

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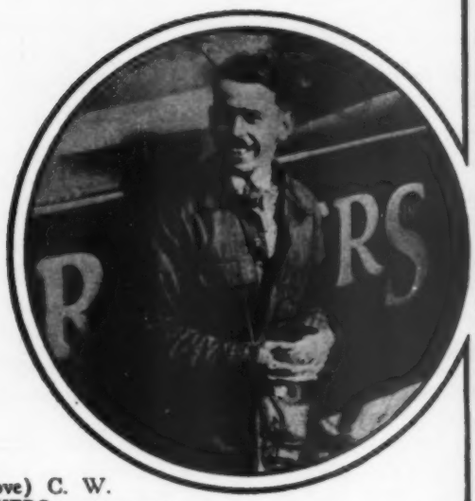
(above) JAPAN GREETS a Czecho-Slovakian flier. Col. Skala's Mobiloil-lubricated plane pictured after his successful flight from Prague to Tokio.

(below) A CLOSE-UP of "We". The "Spirit of St. Louis" has flown over 42,000 miles with Mobiloil and without engine trouble.

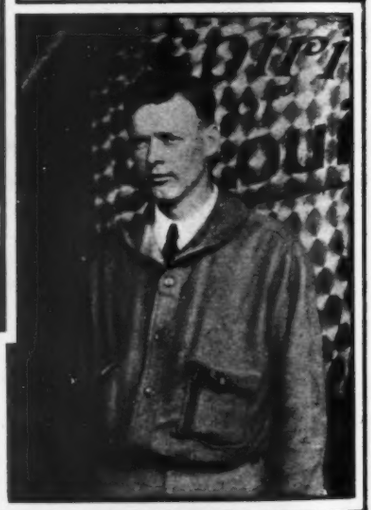
Wide World Photo

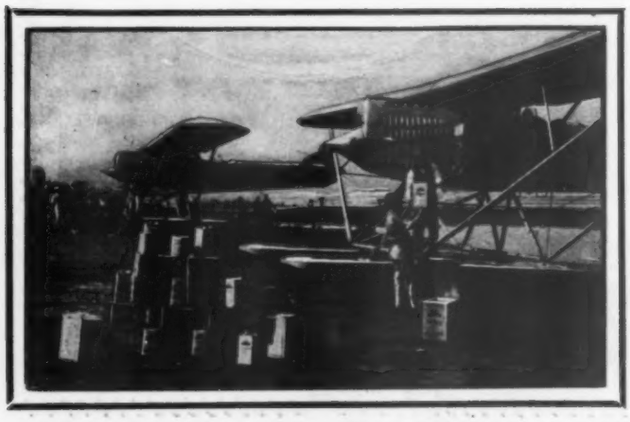


(above) C. W. MEYERS wrote us recently, "As you know, I was lucky enough to win first place in Class 'B' (New York - Spokane) using Mobiloil 'B' with the usual perfect results."

GARGOYLE Mobiloil

(above) "ART" GOEBEL — the Dole flight winner — holds a can of the oil that carried him safely to Hawaii.





(left) THE MEN who flew around Japan last year take on Mobiloil at Beppa, Southwestern Japan.

(right) MAJOR MILLER, who flew around the Union of South Africa, makes sure of correct lubrication for his engine.

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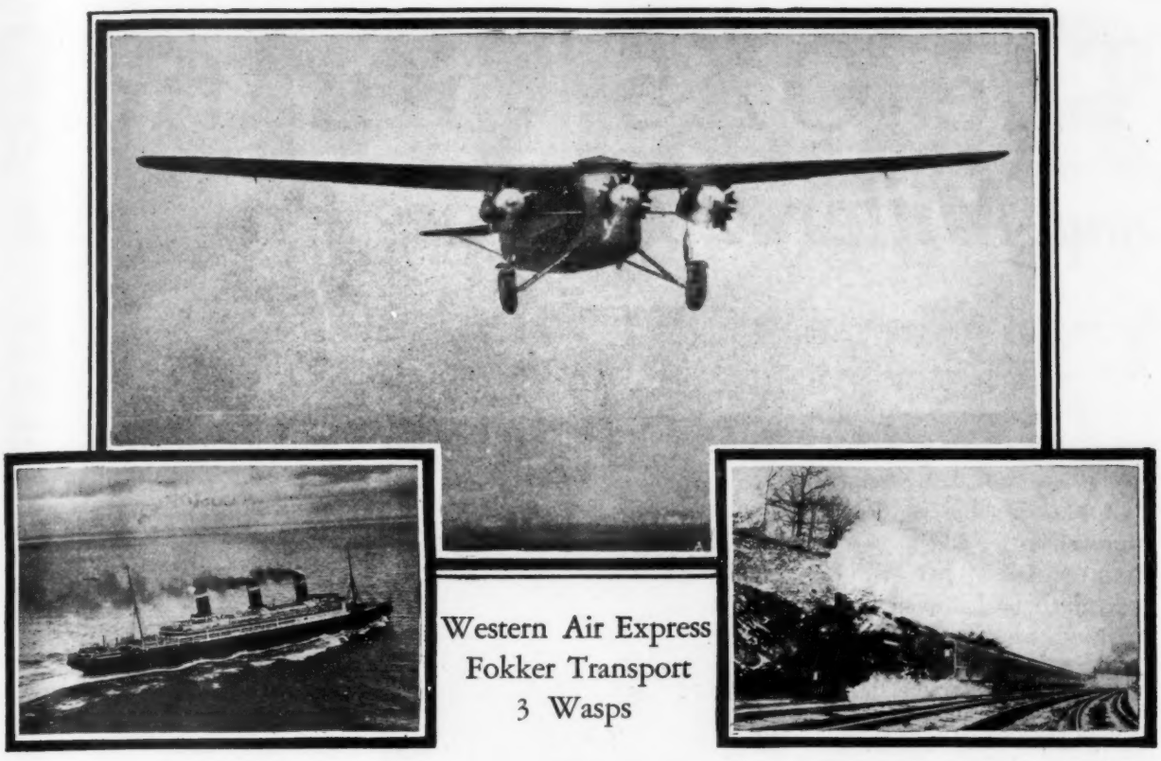

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Leslie C. Miller

To those who in the past our delivery service seemed tardy, we apologize, we did our best, and now promise prompt service to both old and new customers.

Just a word regarding our book, "Rev's for OX's." Over 2,000 copies of this book have been sold to OX owners who wanted to benefit by the store of knowledge of OX motors obtainable in this little book, which sells for $1 and has many suggestions any one of which is worth twenty times the price. This book has just been re-written by Mr. Miller but still sells at the original price. In re-writing Rev's for OX's he has retained the same value to the OX user and in addition has arranged the book in such a manner that it can now be used in connection with the training of new flyers. Rev's for OX's was recently submitted to the chief instructor in the aviation department of one of the largest educational institutions in the world. This instructor's comments are as follows: "May I express my appreciation of a job well done? Certainly for the purpose of conveying definite information to the reader, Mr. Miller has turned out a fine piece of work. I was able to obtain much information from this booklet that has cleared up doubtful points in my own mind." This is only one of the many unsolicited compliments received every day for Rev's for OX's. Write our information bureau for any information you may desire regarding the OX5 motor. Mr. Miller will gladly help out without charge anyone who requests this service.

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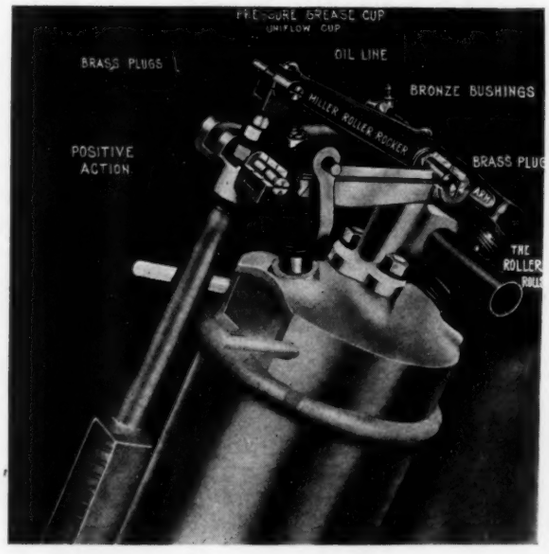

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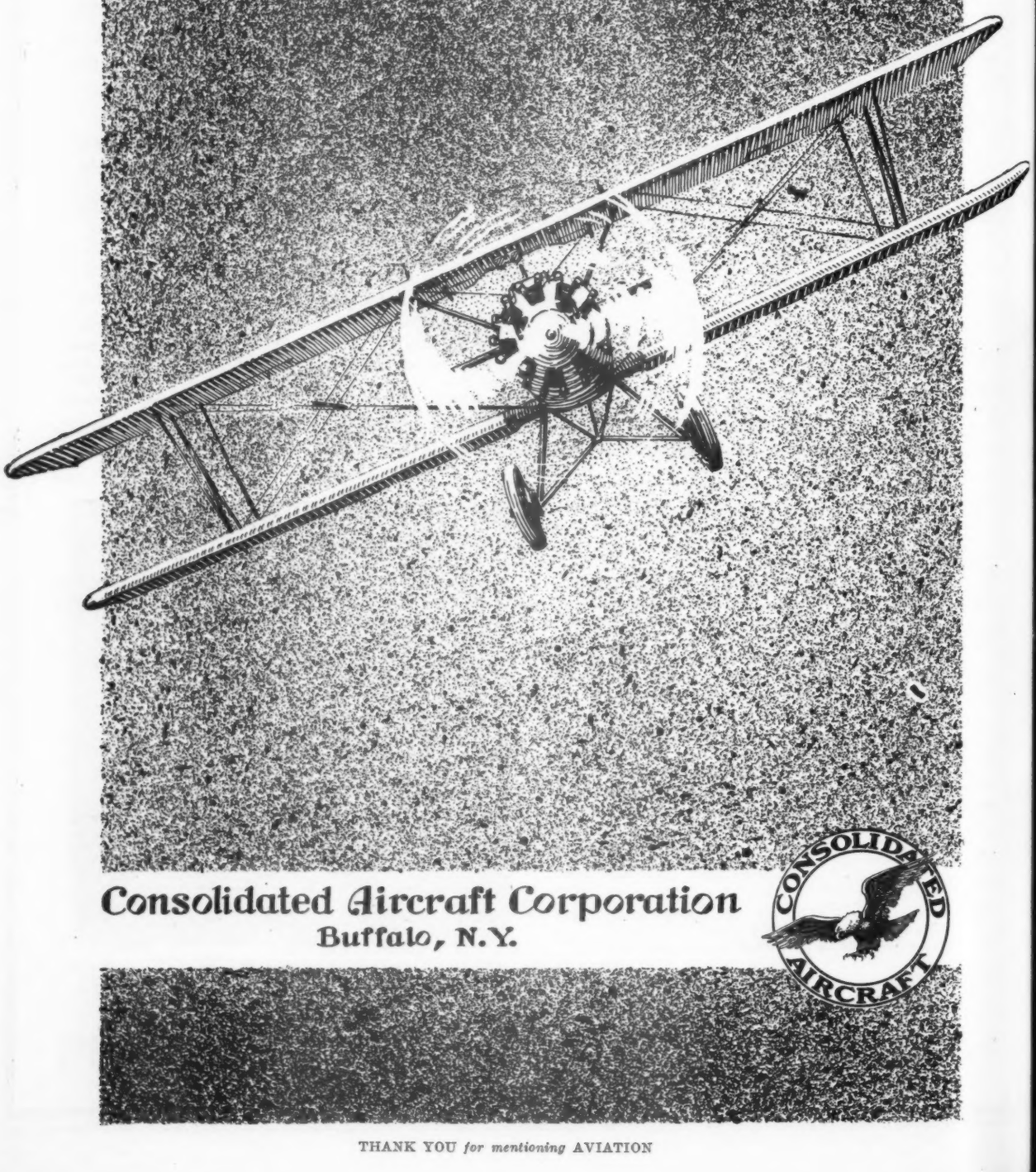

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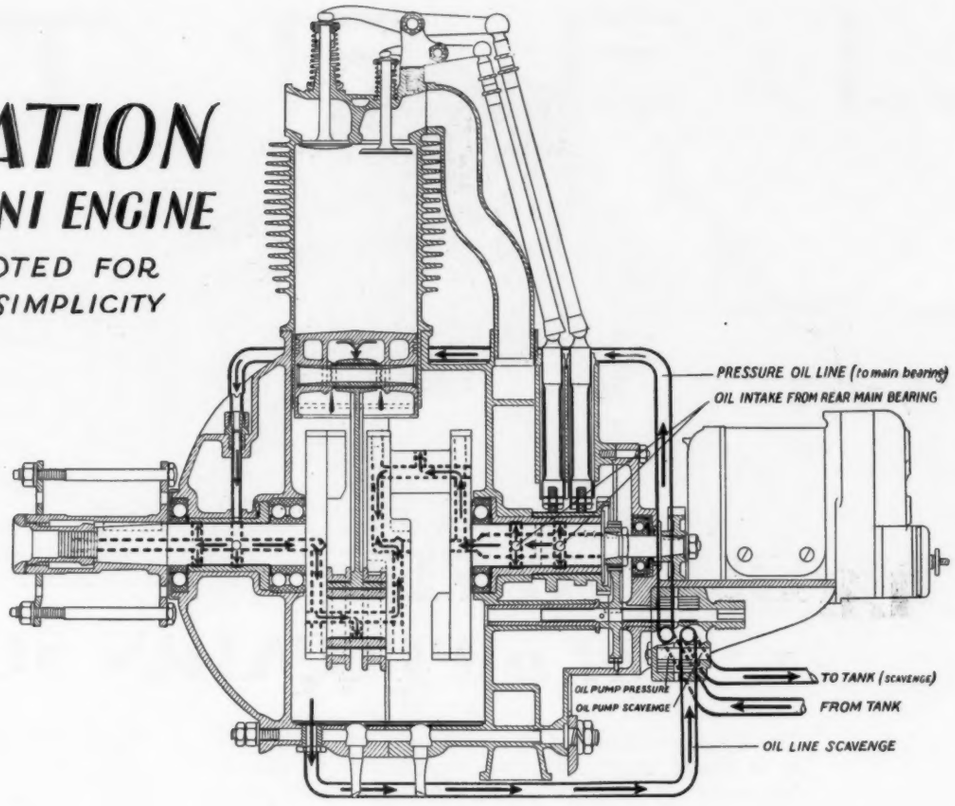

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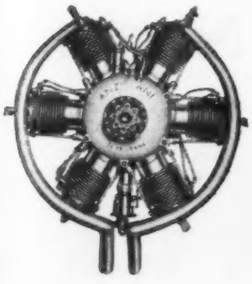

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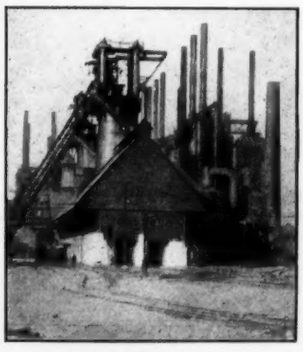

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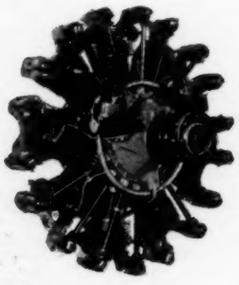

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The Oldest American Aeronautical Magazine

Vol. XXIV | *MAY* 14, 1928 | No. 20

The Tenth Anniversary

THIS WEEK, which has been officially designated as Air Mail Week, marks the tenth anniversary of the inauguration of air mail service in this country. On May 15, 1918 the first regular service, operated with planes and pilots borrowed from the War Department, was started between New York and Washington, D. C. Today there are over 22 routes in operation covering a total distance of 10,740 miles, 6,000 miles of which are lighted for night flying. These routes serve some 31 states and, according to a recent announcement by the Department of Commerce, every state in the Union will be served by air mail before the end of this year.

For the first nine years and two months of this decade of air mail service, operations were carried on by the Government, but since the end of that period the service has been in the hands of private owners. What they have done in the way of expansion and betterment of the air mail service is well known. Their accomplishments stand as tributes to American planes, American pilots, and American business methods. Ten years ago the Government showed the way and today American commercial aeronautical enterprise is carrying on in that good work and making the air mail pay without the assistance of direct subsidies.

The Aeronautical Center

MANY TOWNS are making a bid to become the "Detroit" of the aircraft industry. So far Wichita, Kan., seems to have been able to attract more companies and to build up a bigger production than any other town in the country. The citizens of Wichita are keenly aware of the possibilities of growth in the aircraft industry but other cities are awakening and the competition is becoming keen. If the efforts of the Board of Commerce were the only factor Detroit would already be ahead.

Even after a town has become a center it is sometimes hard to analyze just why this has occurred. Proximity to the raw materials is certainly one factor. In the case of airplanes this factor is of lesser importance because the raw materials are comparatively light and expensive while the cost of shipping the finished product, which is very bulky and delicate, is much greater than the cost of shipping the raw material. Airplanes should logically therefore be built fairly near to the point where the greatest number are likely to be used. The labor market is the second important factor. Often, as in the case of Detroit, there was a comparatively small supply to begin with and labor has followed the growth of the industry. Initial labor conditions must be favorable but it is very debatable whether the proximity of a very large and powerful specialized industry creates a really favorable market. When the powerful industry has a big boom it is almost sure to draw away a large proportion of the labor of the smaller industry. Adequate financing and skilled management are also of extreme importance. If the industry grows as we expect it to it will be hard for the small town to secure adequate financing. The management problem will to a considerable extent settle itself because the personnel will grow up with the center.

Of course it may be possible that there will not be an aeronautical center. Few industries are concentrated to the extent that the automobile industry is concentrated in Detroit. Shipping cost will tend to spread the industry and also the problems of producing thousands of small planes is very different from that of producing a few giant air transport planes. Under present manufacturing methods it is comparatively easy to start an airplane factory in a town. Within a few years however, production will warrant the installation of very expensive machinery and the town with the other required advantages which first gets this machinery in operation will likely become the aeronautical center.

Correct Pronunciation

A SHORT time ago we had the pleasure of listening to a group of prominent city officials eulogize a trio of famous airmen. The various orations were splendidly delivered with the exception of the pronounciation of a most important word. That word was "aviation", and strange as it may appear, those city officials are not the only ones who abuse the word. In fact many persons directly engaged in aeronautical industry pronounce the *av* in aviation as they pronounce the *av* in the word *have*.

That is absolutely incorrect and reference to any standard dictionary will show that the first *a* is pronounced exactly the same as the second *a*. Not only is this true for the word *aviation* but also for the word *aviator*.

Perhaps to some the correct pronounciation of aeronautical terms is a small item, but to the majority it *is* of importance, if for no other reason than the desire to speak good English. Just now the aeronautical industry is engaged in the work of educating the non-flying public in the ways of the art. If it is to be a good teacher of the major items, it might just as well be a good teacher of the minor items. In other words, pronounce *aviation* as *ay"vi-a'tion*.

The New Curtiss "Chieftain"

12 Cylinder Hexagon Engine Rated at 600 Hp. Weighs Only 900 Lb.

By ARTHUR NUTT

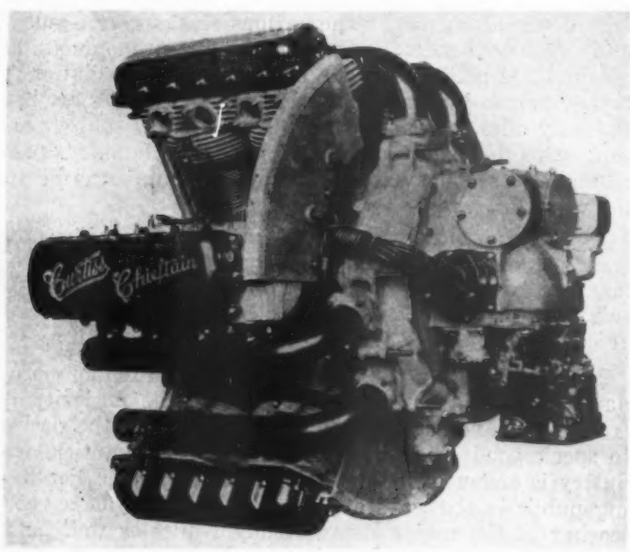
Chief Engineer, Curtiss Aeroplane & Motor Co., Inc.

FLIGHT TESTS were recently completed at Mitchel Field, N. Y., on the new 600 hp. Curtiss "Chieftain", largest air cooled aircraft engine in this country. The tests were conducted with the engine installed in a two-seater Curtiss Falcon, standard observation and attack plane of the Army Air Corps. The plane was flown by Lieut. E. P. Gaines, Army pilot stationed at the Curtiss factory, and by "Casey" Jones, veteran Curtiss pilot.

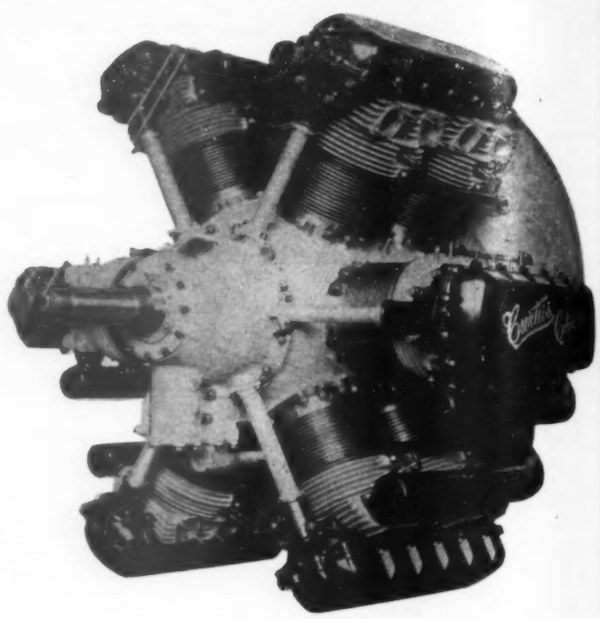
Equipped with the "Chieftain" engine, the "Falcon" showed a performance that was superior to that of any other two-seater in the service. Its top speed was 158 m.p.h., and the service ceiling 22,350 ft., while the initial rate of climb was 1870 f.p.m.

The most remarkable feature of this performance is the speed of 158 m.p.h., which is exactly the same as could be obtained from a water cooled engine of the same power in the same plane. Curtiss engineers point out that this is the first time in history that air cooled engines have been able to compete directly with water cooled types in pure speed. Usually, the substitution of an air cooled engine for a water cooled engine of the same power, while producing improved climb and ceiling, has resulted in a sacrifice of several miles per hour in top speed.

The excellent speed characteristics of the Chieftain engine is due to its unusual design, which is different from that of any other air cooled engine. Instead of having one row of cylinders arranged radially, as is the common practice, the Chieftain has two rows one behind the other, with six cylinders, arranged hexagonally, in each row. This arrangement



Rear quarter view of the "Chieftain" showing the Splitdorf magneto and Stromberg carburetor.



Front quarter view of the new Curtiss "Chieftain" 600 hp. air cooled engine.

materially reduces the overall diameter of the engine, thus reducing the head resistance and increasing the high speed. The frontal area per horsepower of the Chieftain engine is approximately one half of the conventional nine cylinder air cooled engine.

The Chieftain engine has been under development by the Curtiss company for the past two years, with the assistance and guidance of the Air Services. It performed excellently throughout the trials at Mitchel Field, and is soon to be flown to Wright Field, Dayton, Ohio, for Air Corps tests.

In April 1926 a study was started on the design of a 600 hp. air cooled aircraft engine. The first steps in this study were to analyze the types of engines in use at that time and then to study the possibilities of the different forms of engines which would be suitable in the large size contemplated. The types that were finally selected for study were as follows:

9 Cylinder Single Row Radial
14 Cylinder Two Row Radial
16 Cylinder X
12 Cylinder Vee
12 Cylinder Hexagon

In making this study 10 important characteristics were borne in mind.

1. Low weight per horse power
2. Head resistance and propeller efficiency
3. Visibility from the pilot's cockpit
4. High crankshaft speed
5. Overhead valve gear for high speed
6. Exhaust arrangement
7. Control of cooling air
8. Application of reduction gears
9. Overall dimensions particularly diameter and length
10. Smoothness of operation

Nine Cylinder Single Row Radial

This type would require an engine of from 1800 to 1900 cu. in. to develop about 600 b.hp. at a speed in the neighborhood

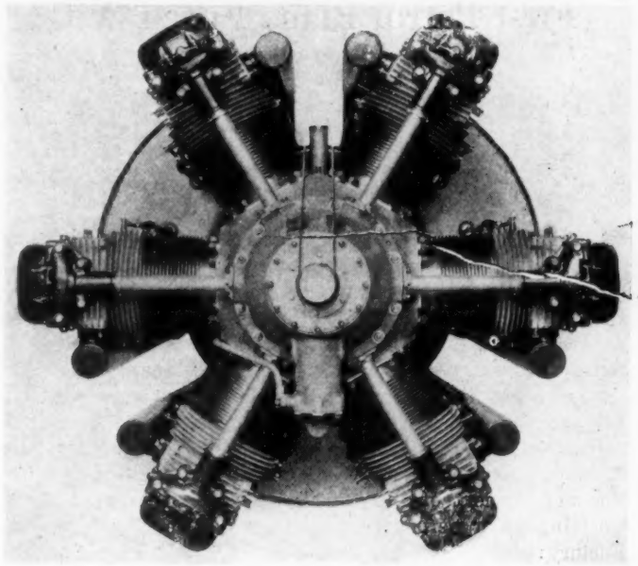
of 1900 r.p.m., which is probably a rather optimistic speed to expect to run an engine of this power and displacement, owing to the fact that the size of the cylinder bore is reaching a point where cooling is difficult, and the reciprocating weights on one crankpin (even though it may be of the split crankshaft and solid big end type) would be a difficult problem. The outside diameter of a nine cylinder radial engine of this power would be 56 in. to 60 in., in diameter which presents a very large frontal area with severe blanketing of the propeller, resulting in poor propeller efficiency. The added diameter increases the resistance so much that it has been found by experience that the larger radial engines in pursuit planes make practically no more speed than the lower horse power radial engines with the smaller diameters. Of course, the rate of climb is increased but this does not offset the disadvantage of carrying high powered engines using more fuel without gaining more top speed.

The exhaust problem on a nine cylinder radial becomes more difficult as the size of the engine increases. The manifold must be made very large in order to decrease the back pressure. The manifolding assembly then becomes very heavy, unreliable and cumbersome, resulting in the necessity of locating it between the propeller and cylinders where it undoubtedly has a detrimental effect on the cylinder cooling as well as making the cylinders very inaccessible. A large diameter radial engine does not lend itself to good cowling and the adaptation of shutters for control of cylinder temperatures and oil temperatures under various weather conditions. It is necessary to use push rod valve mechanism with the attendant difficulty of lubrication of the rocker arms, and the ball and socket joints. The lubrication cannot be fully automatic without adding a great many pipe fittings and tubing which would not be reliable, would increase the expense and would be very unsatisfactory.

Fourteen Cylinder Two Row Radial

This type of engine has been used by several manufacturers in powers up to 450 hp., and is objectionable on account of the lack of satisfactory cooling of the rear row of cylinders, since the cylinder spacing is so close when the outside diameter of the engine is held to a minimum that the rear cylinders get hot air from the front cylinders. The push rod valve mechanism is also unsatisfactory on account of the necessity of staggering the cylinders to a great degree in order to keep the engine diameter down, resulting in high angularity on the push rods and possibilities of increased wear on these parts.

The weight per horse power on the double row radial is slightly higher than the single row radial but it has the advantage of a small diameter which was the reason for investigating this type of engine. The displacement would have to be approximately 1800 cu. in., which would allow smaller cylinders than could be obtained in a nine cylinder type. Both these engines, the nine cylinder radial and 14 cylinder using push rod valve gears, are probably limited in



Front view of the new Curtiss "Chieftain" 600 hp. air cooled engine.

engine speed although this engine speed has in the past few years been increased slightly over what was originally thought could be used with this type of valve gear. There is no question, however, that the push rod valve gear is inferior to the overhead type when high engine speeds are used.

Sixteen Cylinder X

The X 16 cylinder engine has not been given a great deal of consideration on account of the large number of cylinders making the engine more expensive and the necessity of using very heavy counterbalances on the crankshaft to make the engine run smooth. The engine would also be heavier than the radial types on account of the longer crankshaft, although the diameter would be very satisfactory.

Twelve Cylinder Vee

This type of engine has been built successfully with air cooling, it has one very great objection, namely, its overall

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Showing the new Curtiss "Chieftain" 600 hp. engine fitted in a Curtiss "Falcon" observation plane.

The Navy PN-12 Seaplane

First Patrol Plane Fitted With Air Cooled Engines has Top Speed of 107 M.P.H. and a Cruising Range of 1,350 Mi.

By COMDR. W. W. WEBSTER (CC), U.S.N.
Chief Engineer, Naval Aircraft Factory

THE PN-12, the Navy's first patrol plane with air cooled engines, has completed its preliminary tests at the Naval Aircraft Factory, Philadelphia, Penna. This airplane, for some unknown reason, has been referred to in the press as a mystery plane. As a matter of fact, this airplane is merely another step in the Navy's development of the twin engine, heavy boat type of plane for patrol work with the fleet, coastal patrol, submarine patrol, etc. This type started with H-16 and F-5-L during the World War, and has been developed step by step as indicated by the following table. The development of this type has been in charge of H. S. Cocklin, senior aeronautical engineer at the Naval Aircraft Factory:

		Hull Construction and Tail	Wings			Engines			Hp.
Model	Year	Surfaces	Constr.	Profile & Span					
F-5-L	1918	Wood	Wood	RAF-6	104′	2	Liberty	Direct	400
PN-7	1923	Wood	Wood	USA-27	73′	2	Wright T2	Direct	525
PN-8	1924	Metal	Wood	USA-27	73′	2	Wright T2	Direct	525
PN-9	1925	Metal	Wood	USA-27	73′	2	Packard 1A-1500	Geared	475
PN-10	1926	Metal	Wood	USA-27	73′	2	Packard 3A-1500	Geared	550
PN-12	1927	Metal	Metal	USA-27	73′	2	Wright Cyclone R-1750	Direct	525

Note: The PN-11 is of a different design not included in this series.

Practically the same hull lines and displacement have been maintained throughout this development.

As will be seen from the above, the principal advance in the PN-12 over the PN-10, is the substitution of metal wings for wood wings and two Wright R-1750 air cooled engines for the former Packard water cooled engines. With the latter change a saving of 1450 lb. was effected in power plant weight, with but a small loss in horsepower.

In the PN-12, therefore, is incorporated all of the latest proven structural and aerodynamic features applicable to this type of plane, including metal construction throughout, air cooled engines, and complete navigational and radio equipment, including radio compass and arrangements for sending and receiving when on the water. The metal construction of this plane includes two complete and two partial watertight bulkheads and all possible arrangements for remaining afloat at sea, in case of a forced landing. An additional feature on the PN-12 is an adjustable stabilizer.

Since the trials of the PN-12 have not been completed, it is not possible to give actual performance data at this time. However, the calculated design data, based on the engines developing 525 hp. each at 1900 r.p.m., and a conservative service weight of only 14,100 lb. is given in the following table. For the purposes of comparison, the corresponding data of the F-5-L is given in the second column:

Service Condition as Patrol Planes

	PN-12	F-5-L
Gross Weight, lb.	14,100	13,260
Weight Empty, lb.	7,500	8,720
Useful Load, lb.	6,600	4,540
Gasoline, gal.	750	475
High Speed, m.p.h.	107	90
Stalling Speed, m.p.h.	58	52
Service Ceiling, ft.	10,900	5,500
Endurance, hr. (cruising)	18	12
Range, mi. (cruising)	1,350	800

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Front quarter view of the Navy PN-12 powered with two Wright "Cyclone" engines.

Chassis Analysis

Stress Analysis of Commercial Aircraft, Chapter Number Ten

By PROFESSOR ALEXANDER KLEMIN

Daniel Guggenheim School of Aeronautics

And GEORGE F. TITTERTON

Late of the Bureau of Aeronautics, Navy Department

AFTER THE wings have been analyzed the usual procedure is to analyze the chassis. The experienced pilot may bring in a plane smoothly as a general rule but occasionally a landing must be made on a rough field or in gusty weather and a bumpy landing results. The chassis must therefore be designed for the severe landing and, as in the flight conditions, a load factor must be introduced to give the required strength.

If the landing gear were rigid the shock of landing would strain the entire structure of the plane well beyond its allowable stress. It is therefore necessary to incorporate a shock absorbing system somewhere in the chassis structure. This shock absorber dissipates the energy of landing, thus relieving the impact or shock loads. The usual deflection of shock absorbers is between 4 and 6 inches. The tires flatten out on landing thus giving an additional deflection, which must be taken into account when calculating the shock absorbing system. When the tire and shock absorber are fully deflected it is apparent that the chassis then has a different tread and that the angles of the struts have changed, etc. The analysis of the chassis is usually made for this fully deflected condition.

It is important that all parts of the chassis be of nearly equal strength. This is especially true of the wheels. It has been the general practice in the past to design a good, strong chassis, and then equip the plane with small wheels which have a rated strength well under the design value.

Requirements of the Commerce Department.

In chapter 3 the requirements of the Commerce Department were explained in detail. They will be reviewed here and the table of landing factors which has been revised since the publication of Chapter 3 will be reprinted. It is to be noted that the distinction between open cockpit and cabin planes has been done away with and the factor on the light cabin plane increased. The table follows:

Load Factors for Landing Conditions.

Class	Required Factor	Height of Free Drop for Shock Absorber (Inches)
2,500 lb. or less	6.5	24
5,000 lb.	5.5	20
12,500 lb.	5.0	18
Over 12,500 lb.	4.5	18

For seaplanes the required load factor is 8.

The chassis shock absorber must be designed to absorb the energy corresponding to the free drop listed above without subjecting the chassis to forces greater than those corresponding to the load factors in landing. If the oleo or oleo-pneumatic type of absorber is used the required factor may be decreased 25 per cent but no reduction in the height of free drop is allowable.

Level Landing Condition—The propeller axis is assumed horizontal and the basic value of the vertical component of the resultant of the ground reaction is equal to the gross weight of the airplane minus the chassis and wheels. The horizontal component is of the magnitude required to give the resultant force its specified direction—i.e. the direction of a line drawn through the center of gravity of the plane and the axle.

Level Landing with Side Load—In addition to the loads found in the level landing analysis, the loads due to a side component must be added in this condition. This side component is to be taken as one-quarter the vertical component of the level landing condition, and is assumed to act at the ground. The tire is assumed to be deflected one-half of the nominal diameter of its cross-section.

Three-point Landing—The basic value of the sum of the ground reactions is the gross weight of the airplane. The total load is divided between the chassis and tail skid in inverse proportion to the distances, measured parallel to the ground line, from the center of gravity of the airplane to the points of contact with the ground. The net basic load on the chassis is equal to the total load on the chassis minus chassis and wheel weight. The loads are assumed to be perpendicular to the ground line in the three-point landing attitude.

Design of Chassis Struts

When the strut is in pure tension or bending the ultimate tension or modulus of rupture value of the material used is the allowable stress. For struts in pure compression either the Euler or Johnson curves for columns must be used. In most types of chassis there is one strut or axle which is in both tension and bending. The sum of these two stresses must be within the modulus of rupture of the material. These stresses usually run very high and it is often necessary to use alloy steel heat-treated to 150,000 or 180,000 lb. per sq. in. ultimate strength. Occasionally a strut will be in combined bending and compression. In this case the required stress is the sum of $f_b = My/I$ plus $f_c = P/A$. The allowable stress may be obtained from the formula explained in previous chapters, namely,

$F_t = f_b/f_t$(Mod. of Rupture — Y.P. in Comp.) + Y.P. in Comp.

The values of I and A needed for the design of struts may be obtained from Tables 4 and 5 of Chapter 5.

Airplane Wheels.

At the present time the great majority of airplane wheels are made of wire. Disk wheels have been developed but at present are not widely used. The strength, weight, and important dimensions of commonly used standard wheels are listed in Table 16.

Table 16—Properties of Standard Wheels.

Wheel Size	Breaking Load Pounds	Weight Complete with Tire, etc.	Hub Length Inches	Hub Dia. Inches
26 x 3	6,500	18	6.0	1.447
28 x 4	7,500	24	6.0	1.697
32 x 6	13,500	39	7.25	2.197

Continued on page 1404

The Langley Field Maneuvers

Ninety Air Corps Planes take Part in Demonstration of Offensive And Defensive Value of Modern Military Aircraft

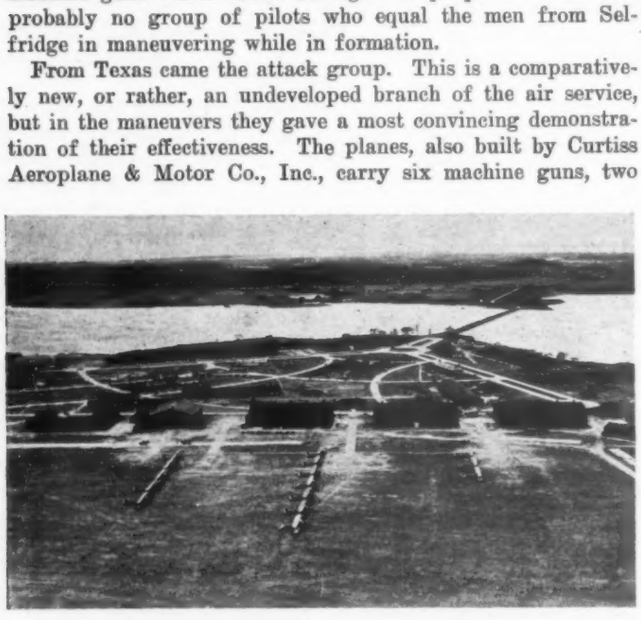
By EARL D. OSBORN

RECENT YEARS have not only brought about great changes in aeronautic design but have also seen a very marked development in war strategy and tactics of heavier-than-air craft. This was shown in a most interesting and effective fashion by the combined aircraft maneuvers which were held at Langley Field, Va., on May 4, and which gathered together aircraft groups from all over the country.

Langley Field, which is the home of the bombardment planes, is situated near Newport News and Fort Monroe. This locality has been a center of military activity and permanent garrisons for more than 300 years. The bombing section consisted of some 20 Keystone "Pirates" or LB-5's. These planes which were built last year, are powered with two Liberty 400 hp. engines, carry a load of 2,000 lb. of bombs, and have a ceiling of 10.000 ft.

From Selfridge Field, Mich., came the pursuit group, flying 25 Curtiss "Hawks", which are powered with Curtiss D-12 engines. These planes are single seaters and carry two machine guns which shoot through the propeller. There is probably no group of pilots who equal the men from Selfridge in maneuvering while in formation.

From Texas came the attack group. This is a comparatively new, or rather, an undeveloped branch of the air service, but in the maneuvers they gave a most convincing demonstration of their effectiveness. The planes, also built by Curtiss Aeroplane & Motor Co., Inc., carry six machine guns, two



A section of Langley Field, Va., as seen from the air.

on each wing, two in the gunner's cockpit, and two shooting through the propeller. They also carry a number of light bombs. These planes are used for attacking ground troops and fly very low, depending on their speed and light armor for protection.

The planes assembled at Langley consisted of 25 Pursuit, 23 Attack, 30 Bombers, 7 Observation, and 15 Transport; a total of 90 planes. This is not a very large number but it is practically the total number of planes which as organized units would be able to go into battle on a day's notice. There were also a number of older types of planes present, bringing the total up to over 100.

The ninety odd planes mentioned above are the beginning of the development which is to take place under the five-year program. By 1932 there should be a total of 99 attack planes, 158 bombardment planes, 429 pursuit planes, and 500 observation planes, with 1,550 flying officers and 15,000 enlisted

Air view of the targets at Langley Field before the attack.

men. Although there have been other concentrations of aircraft in previous years, this is the first one at which the attack group has participated on a large scale and in which all the various units of offensive aviation have functioned together.

Besides the pursuit, bombardment, and attack planes, there are observation, training planes, and a few miscellaneous types such as transports. The training planes of course are not used in actual warfare and the observation planes are used entirely as auxiliaries to the ground troops. The maneuvers at Langley Field were meant to show to the officers of the other branches of the service what were the functions and capacities of aircraft acting on the offensive, and what would be necessary measures to take against them. Incidentally, members of Congress and the press were invited to view the maneuvers. Several squadrons of bombing planes were sent up to Washington to bring the guests to Langley and the return flights, which were in formation, proved quite a revelation of the skill required in this kind of flying.

Demonstrations were also held at Fort Bragg, N. C., Fort Benning, Ga., Fort Sill, Okla., Forts Riley and Leavenworth, Kan. These demonstrations away from the home bases are excellent training, as they are a nearer approach to actual war conditions.

The demonstration at Langley Field was begun by an attack upon a formation of bombers by pursuit planes. The attack took place over the field at an altitude of about 2,000 ft. The bombers flew in a very close wedge formation, with the leading planes somewhat higher than the next succeeding ones.

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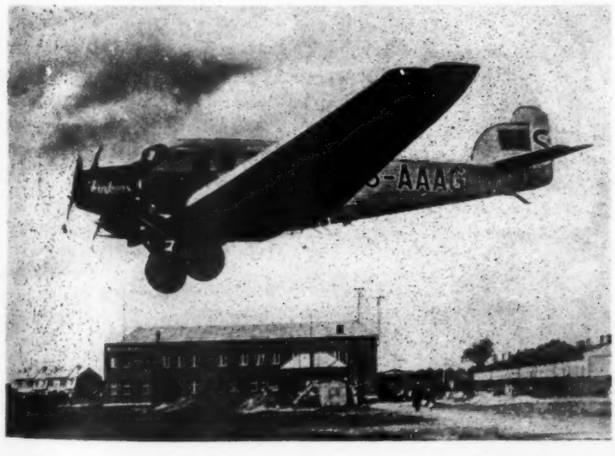
Aeronautics *in* Sweden

First Air Line, Stockholm-Halsingfors was Established in 1924 and Since that Time Considerable Progress has Been Made

By A. L. OLSON

DURING THE first three years of its existence, civil aviation in Sweden has made gratifying progress. The service was inaugurated on June 2, 1924, with the opening of an air line between Stockholm and Halsingfors, Finland. Within a month another line was in operation between Malmo, on the southern tip of Sweden, and Hamburg. From Malmo the line now extends north to include Gothenburg, Sweden's leading commercial port, and Oslo, the capital of Norway. Through three main air centers, Stockholm, Kalmar and Malmo, Sweden today is in direct connection by air with the leading centers of Europe as far south as Paris and Vienna.

The Stockholm-Halsingfors route was popular from the first. Last October, as service was suspended for the winter season, the Swedish and Finnish companies announced that a twice-a-day schedule was in prospect for 1928, especially during the height of the summer season. Such service will then permit of a flight, say, from Stockholm to Halsingfors and a return the same day. The route is one of the most beautiful in Europe. It passes above the hundreds of islands that form the Stockholm skerries, with only a 15 min. flight over open water before the islands off the low Finland coast begin. The popularity of the route with tourists, as well as business men, accounts for the rapid increase in traffic from



Flight picture of a Swedish Junkers air liner built at Limhamn near Malmo.

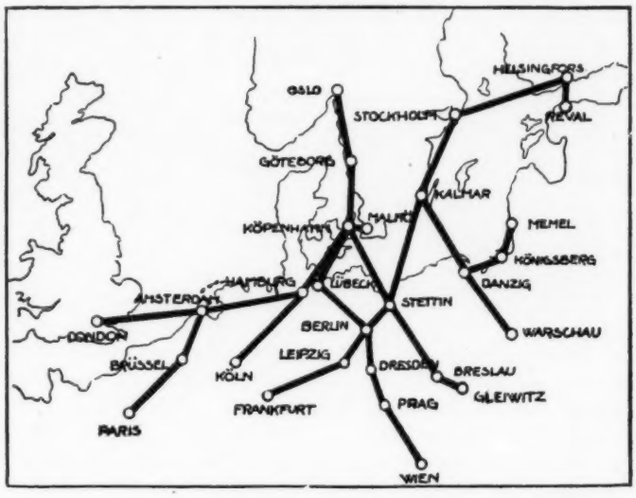
year to year. In 1926 the total number of passengers carried was 700. In 1927 that total had been increased by more than 500.

Last fall, near the end of the season, Malmo reported that there had been a 50 per cent. increase of passengers carried in 1927 as against the number of the year before, a 400 per cent. increase in transport of freight and approximately a 100 per cent. increase in carrying of mail. From the very beginning of the operation of the Swedish lines, provisions were made for mail service and regular transport of goods.

The figures that follow indicate the development during the three-year period—the number of passengers carried and the total in kilograms of freight and mail.

	1924	1925	1926	1927 (Estimated)
Passengers	3230	10,026	10,176	12,000
Freight (kg.)	481	48,984	57,775	70,000
Mail (kg.)	4079	7,058	9,998	12,500

From the first the Swedish company, A.-B. Transport, realized that it would have to depend on government sub-



Map of Sweden's air lines and their connection with those of Europe (1927).

vention in part, a situation similar to that existing in many other European countries. The Swedish Company was first incorporated for 356,000 *kronor* (1 Swedish *krona* = approximately 27 cents); later the sum was raised to one million. The government has lent its support with a subsidy pro rata per kilometer flown and loans for the purchase of "rolling stock." Last August the company submitted to the Swedish Parliament an estimate of 8,686,200 *kronor* as the sum needed for the fiscal year 1928-9.

The planes selected for the service are the all-metal Junkers type, built in Sweden. For the regular passenger service the tri-engine plane, accommodating nine or ten persons, is used. The single engine plane is used for trial and special flights. The Swedish A.-B. Transport, after several tests, decided on the all-metal Junkers as the plane that promised to ensure the greatest safety for the passengers.

Safety first is the keynote on which the whole Swedish air service operates. This is to be expected in a country where the railways have already made an enviable record, compared with railways elsewhere, for reduction of accidents. The air pilot is instructed to take no risks. In an emergency, he is told that it is often the better part of wisdom to return to the starting-point. Delays are less serious than foolish hazards resulting in loss of life.

Continued on page 1395

The Lockheed "Air Express"

Latest Design of Lockheed Aircraft Co., is powered with a "Wasp" and Has a Speed of 167 M.P.H. with Full Load of 1000 Lb.

PRELIMINARY FLIGHT tests were recently completed on the Lockheed "Air Express", the latest product of the Lockheed Aircraft Co., located at Burbank, Calif. The Air Express is an outgrowth of the original "Vega" design, which is the type of plane that Capt. George H. Wilkins used on his recent flight across the North Pole regions.

The Air Express is an all wood monoplane with monocoque fuselage similar to the earlier Lockheed planes. The chief characteristic of the new plane is that it was designed to carry a Pratt & Whitney Wasp engine and has the full cantilever parasol wing set above the fuselage on short center section struts.

Most remarkable of all features of this new plane is the performance of 167 m.p.h. with full load of 1,000 lb. In the flight tests it is said that a speed of 170 m.p.h. in level flight was easily attained. The cruising speed of the Air Express is set at 135 m.p.h. The Air Express will climb 1,460 f.p.m. at sea level and will climb to 10,000 ft. in 10 min. with full load.

The Air Express does not differ in construction from the Vega, having the same monocoque plywood fuselage which is formed in a great concrete mold under a pressure of 50 tons to the sq. ft. This construction affords excellent streamlining and also lends itself to large scale production. For the benefit of those who may not remember the description of the Vega model, the Lockheed fuselage is constructed in two identical parts which are later joined together top and bottom from nose to tail. The shell is formed of plywood veneer strips laid in two diagonal transverse layers and one longitudinal layer. Two coats of glue are applied and the layers are united into one unit shell of great strength by being placed in a large concrete mold and being subjected to a pressure of 50 tons per sq. ft. applied to an air bag in contact with the shell. This shell when assembled into the fuselage has no internal bracing other than laminated rings glued and screwed at intervals to maintain the transverse section shape. These laminated rings are of greater strength at the points of stress where wing and engine mount are fastened. The engine mount is steel tube, while the cowling is of aluminum. An aluminum tail piece is also used to complete the streamlining at the rear of the fuselage. Windows and doors are cut in the plywood and the openings so made are reinforced.

Side view of the Lockheed "Air Express" in flying position.

The wings of all Lockheed planes are of full cantilever structure with a hollow box spar with plywood sides and carrying a built up Warren truss within. The wing covering is of plywood taking the drag load. Gasoline is carried in three wing tanks. Pilot's vision forward has been improved in the Air Express by the fact that the entire wing is set up above the top of the fuselage on four short struts with steel tube bracing. The ailerons are faired into the wing.

Although the lines and proportions of the Lockheed planes

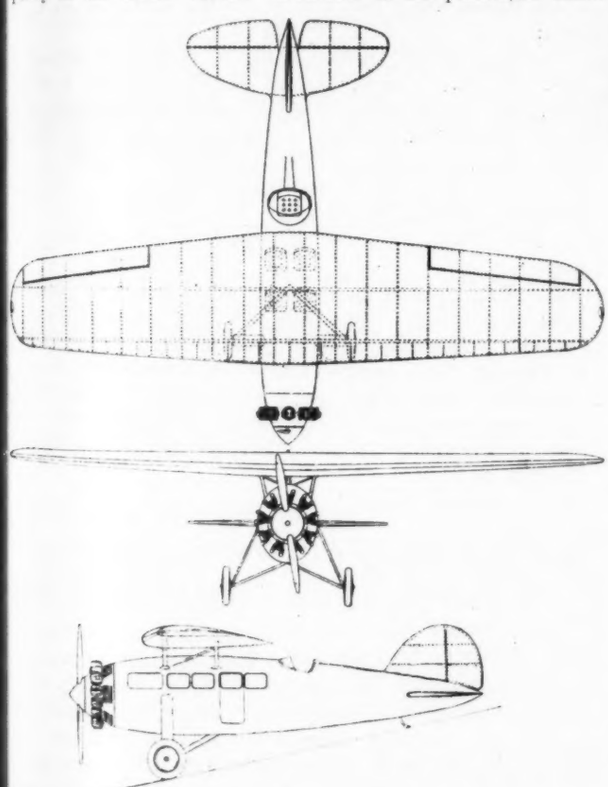
Rear quarter view of the Lockheed "Air Express" powered with a Pratt & Whitney "Wasp" engine.

suggest the fighting or racing craft, this product has been designed primarily as a commercial machine and is of exceptionally sturdy construction. The wings have been successfully sand tested to 14,400 lb. and the fuselage is said to be designed to a very high safety factor. The safety of the Lockheed fuselage is said to lie in the absence of any structural members which might collapse and crush the occupants and in the characteristic of the plywood shell which will in itself absorb a shock at any point and exert a great resistance to collapse of the fuselage structure. An added factor is said to be incorporated into the design of the Air Express by placing the pilot to the rear and above the passengers' cockpit. In this position he is out in the open and has clear and unobstructed vision in practically every direction.

Fitted with Lockheed Hydraulic Brakes

Controls on the Air Express are push and pull rods wherever possible, and are provided with inspection openings which completely protect them from accidental external injury. As in the Vega model, the horizontal adjustable stabilizer is full cantilever and is neatly faired into the tail. The undercarriage is of conventional divided tripod type. The wheels are fitted with individual Lockheed hydraulic brakes.

The air express was designed to carry four passengers and mail in a compartment ahead of the passengers. It is possible to increase or decrease either the passenger or mail capacity as the traffic varies. Entrance to the passenger cabin



Three view drawing of the Lockheed "Air Express".

is by a large door on the left hand side of the fuselage. There are six large windows in the passenger compartment, the seats and sides of the compartment are well padded and richly upholstered in brown leather, the floor is carpeted, and both forward seats are folding for easy entrance and exit. The passenger cabin has a dome light installed in the ceiling and the plane is equipped for night flying. Ventilating windows are also provided in the passenger cabin, the entire plane presenting every luxury for rapid air travel. The cabin is heated from the exhaust, which is muffled, making the interior of the cabin pleasantly quiet while in flight.

The Lockheed type of construction is the result of many years of development work. No expense has been spared to learn the best method for the accomplishment of every detail of construction. The result has been the perfecting of every

Interior view of the well upholstered cabin of the "Air Express".

angle of factory production to the point where quantity schedules may be inaugurated without affecting the high quality of workmanship. The Lockheed factory is now stepping production up to three planes a week, has more than 100 men on the production line, and is erecting a new factory building that has been designed from start to finish for efficient mass production.

Great strides are being made at the present time through the use of accurate patterns and jigs which simplify rib and spar assembly. Tools and jigs have also been developed for the metal working and welding, while the great fuselage molds make rapid production of complete shells comparatively simple.

In the assembly room the workmen have been provided with special mats, step ladders, overhead lifting machinery, extension lights and rapid electrical drills and finishing tools while the final assembly blue prints are carried upon portable easels which are erected at the most advantageous points. The result of this organization of every phase of manufacture assures the most uniform and perfect product that it is possible to build.

The manufacturer's specifications of the Lockheed Air Express are as follows:

Wing span	41 ft.
Length	27.5 ft.
Cargo space	50 to 100 cu. ft.
Passenger capacity	2 to 4 persons
Fuel capacity	100 gal.
Oil capacity	10 gal.
Pay load	1,000 lb.
Engine	410 hp. Pratt & Whitney Wasp
Starter	Eclipse Electric and Hand Inertia

Continued on page 1394

The Lockheed "Air Express"

Latest Design of Lockheed Aircraft Co., is powered with a "Wasp" and Has a Speed of 167 M.P.H. with Full Load of 1000 Lb.

PRELIMINARY FLIGHT tests were recently completed on the Lockheed "Air Express", the latest product of the Lockheed Aircraft Co., located at Burbank, Calif. The Air Express is an outgrowth of the original "Vega" design, which is the type of plane that Capt. George H. Wilkins used on his recent flight across the North Pole regions.

The Air Express is an all wood monoplane with monocoque fuselage similar to the earlier Lockheed planes. The chief characteristic of the new plane is that it was designed to carry a Pratt & Whitney Wasp engine and has the full cantilever parasol wing set above the fuselage on short center section struts.

Most remarkable of all features of this new plane is the performance of 167 m.p.h. with full load of 1,000 lb. In the flight tests it is said that a speed of 170 m.p.h. in level flight was easily attained. The cruising speed of the Air Express is set at 135 m.p.h. The Air Express will climb 1,460 f.p.m. at sea level and will climb to 10,000 ft. in 10 min. with full load.

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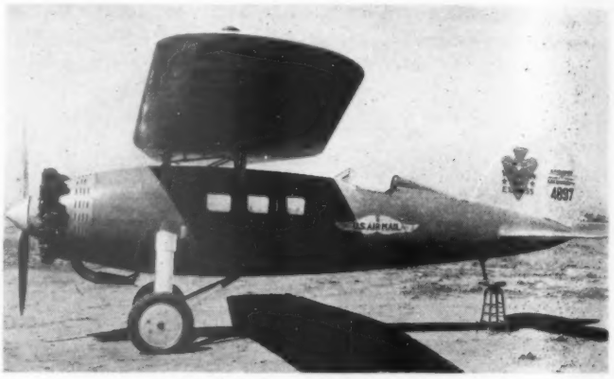

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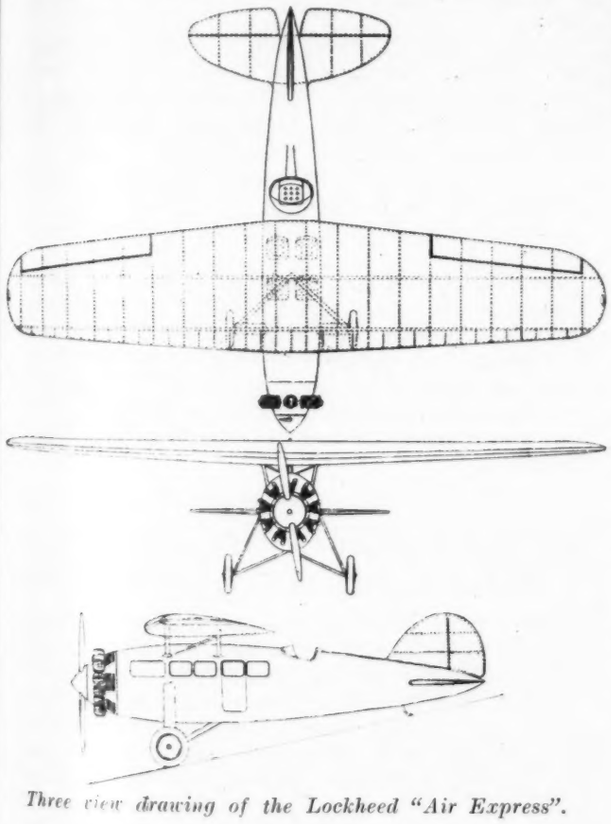

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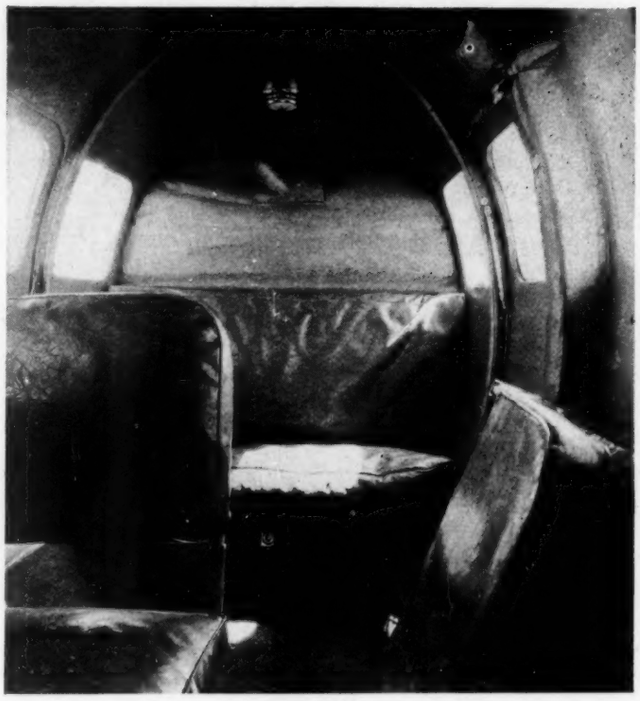

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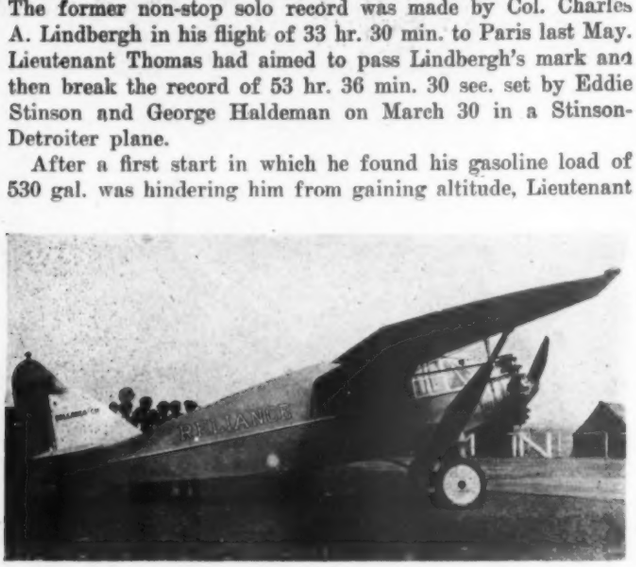
Continued on page 1394

Lieutenant Thomas Sets New Solo Flight Record Though Endurance Attempt Fails

THOUGH his attempt to break the world endurance record in his Type CH Bellanca monoplane "Reliance" ended in failure, Lieut. Royal V. Thomas of Durant, Mo., nevertheless set a new world's solo flight duration mark in flying his Wright Whirlwind powered plane for 35 hr. 25 min. 8 sec. The former non-stop solo record was made by Col. Charles A. Lindbergh in his flight of 33 hr. 30 min. to Paris last May. Lieutenant Thomas had aimed to pass Lindbergh's mark and then break the record of 53 hr. 36 min. 30 sec. set by Eddie Stinson and George Haldeman on March 30 in a Stinson-Detroiter plane.

After a first start in which he found his gasoline load of 530 gal. was hindering him from gaining altitude, Lieutenant



The Wright Whirlwind powered Bellanca monoplane "Reliance" in which Lieut. Royal V. Thomas set a new solo duration mark.

Thomas landed, lessened his fuel load to about 480 gal., and again took off. He left Roosevelt Field, L. I., successfully at 12:30:01 P.M. May 2 and flew the Bellanca until 11:57:09 P.M. May 3 at which time a leak in the dump valve of the main fuel tank grew larger and caused the valve to give way resulting in a great gasoline loss. Lieutenant Thomas made his landing at Mitchel Field a half mile from his take off point at Roosevelt Field.

Monument Erected at Kitty Hawk, N. C. Commemorates Pioneering of the Wrights

SPONSORED BY Capt. William Tate, who brought the Wright brothers to select Kitty Hawk, N. C., for their experiments, a monument has been erected near the beach dunes at the North Carolina village honoring the heavier-than-air flight pioneers, Orville and Wilbur Wright. The inscription on the stone reads: "On this spot Sept. 17, 1900, Wilbur Wright began the assembly of the Wright brothers' first experimental gilder which led to man's conquest of the air. Erected by the citizens of Kitty Hawk, N. C., 1928."

The scene of the first flight, made by Orville Wright in the comparatively frail four cylinder engine powered biplane on Dec. 17, 1903, was Kill Devil Hill, three miles from Kitty Hawk, where the brothers found an eminence and satisfactory wind currents for the projection of their plane.

Reynolds Aviation of North Carolina Takes Agency for Monocoupe and Stinson Planes

GEORGE W. ORR, business manager of Reynolds Aviation of North Carolina, Winston-Salem, N. C., returned from the Detroit Show with announcements that he has closed dealership contracts for the Monocoupe plane and the Stinson monoplane, both four and six passenger sizes. The company already has the agency for the Waco plane, and Mr. Orr states that it is planned eventually to have representation of practically every type of plane.

Three Western Air Express Fokker F-10's Now Touring U. S. on Way to Los Angeles

THREE TRI-ENGINED Fokker F-10's are now en route from New York to Los Angeles, making stops at nearly 40 cities for programs arranged by the various chambers of commerce in the respective communities. The first plane is following a northern route across the continent, the second a central route, and the third a southern one in these tours which were arranged by the California Development Association with the cooperation of the Western Air Express Co., owner of the planes which are later to be used in passenger service between San Francisco and Los Angeles.

A representative of California is flying in each of the great 12 passenger monoplanes. These men are W. D. Longyear, treasurer of the American Bankers' Association, Henry C. Maier, vice president of the Bank of Italy and one of the organizers of the new Stanford University School of Aeronautics, and C. Zook Sutton, manufacturer and airplane pilot. A Western Air Express official is also flying in each plane.

The Routes

The routes being followed across the continent are as follows:

Northern route: Boston, Albany, Buffalo, Cleveland, Toledo, Detroit, Chicago, Moline, Omaha, Denver, Salt Lake City, and Los Angeles. Central route: Philadelphia, Pittsburgh, Columbus, Dayton, Indianapolis, St. Louis, Kansas City, Wichita, Amarillo, El Paso, Tucson, Phoenix, Los Angeles. Southern route: Baltimore, Washington, Richmond, Columbia, Atlanta, Montgomery, New Orleans, Houston, Dallas, Fort Worth, Midland, El Paso, Tucson, San Diego, Los Angeles.

The Fokker F-10 plane, described in detail in last week's issue of AVIATION, is the most powerful commercial airplane yet built in America. The F-10 is powered with three Pratt & Whitney Wasp engines developing a total of 1200 hp.; it has a high speed of 148 m.p.h. and is said to exceed in speed any commercial plane manufactured in Europe. The F-10's were constructed by the Atlantic Aircraft Corp. at Hasbrouck Heights, N. J.

Red Bird Aircraft Co. Officials Tour State Of Kansas in First Plane Company Builds

THE FIRST plane to be completed by the Red Bird Aircraft Co., Bern, Kan., an OX-5 biplane, recently completed a demonstration tour throughout the State of Kansas. Those making the trip were Harry Frey, designer and general manager of the company, Melvin Coates, engineer, and Edwin Ross, chief test pilot. Stops were made at Topeka, Herrington, Wichita, McPherson, Abilene, Fort Riley, and several other cities.

It was stated by an official of the company that the performance of the plane on the tour caused the company to decide to increase its manufacturing facilities and that the plane will soon be manufactured at the rate of one a week. The plane is said to have a remarkably quick take off and slow landing speed due to the airfoil developed by Frey. The plane carried a load of 840 lb. on the entire trip. Its weight empty, with water, is 1160 lb. It has a span of 32 ft. on the upper wing and 30 ft. on the lower wing. It is 23 ft. 6 in. long and 9 ft. high. The wing area is 285 sq. ft.

Nicaragua Report Lauds Work of Corsairs In a Recent Attack on Rebels at Chipote

THE MOST interesting feature of activities of the U. S. Marines in Nicaragua is the wonderful results being obtained with aircraft. Throughout the activities there, aircraft have been the most effective for all types of work, even including direct attack against ground troops. In fact in one of the recent engagements at Chipote, Vought "Corsair" planes conducted a successful, independent and unsupported air attack against a fortified position held by ground troops. The report from Nicaragua on this attack was as follows:

"In the Chipote fight Sandino had 1500 men, well armed and well led, dug in on a mountain over 3000 ft. high. They had plenty of machine guns and plenty of ammunition. General LeJeune saw the position and said it would have taken a full regiment of troops to carry the position and they would have suffered heavy casualties in so doing. We had only four 'Corsairs' available when ordered to attack the position. We went after them with fragmentation and 50 lb. demolition bombs, fixed and flexible guns, and finished up with infantry hand grenades. The first attack was planned as a preliminary affair, believing the strength of the enemy and small number of planes would require at least four attacks to finish the job. A swift approach was made from an unexpected direction, attacking in two columns without reconnoitering.

Attack Met By Barrage

The attack was met by a barrage of incendiary rockets. We came down with front guns wide open and began with light bombs at about 600 ft. The rifle and machine gun fire was heavy and most of the planes stopped some bullets. The planes following came in with heavier bombs. After the second dive, the enemy broke cover and there was a wild stampede. After that the party was wild and furious, and when we got through, the place was badly messed up. On the following day the mountain was devoid of bandits. According to Sandino's own statement, his entire army deserted him except about 150 of his old reliables. It all sounds like a fantastic story, but is nevertheless true. This adds another to the many other exploits the 'Corsairs' have to their credit."

There were no casualties to the Marines in this attack, and the slight damage to the planes was quickly repaired. This report of actual operations emphatically proves the value of aircraft in warfare, particularly over difficult country.

Westchester Airways, Inc., Establishes Passenger Service Branch at Toledo, O.

ANNOUNCEMENT HAS been made of the establishment of a branch of Westchester Airways, Inc., in Toledo. The new company will operate from the Toledo Municipal Field until the new Trans-Continental Field is in condition. Lieut. Harry J. Runser is managing director and pilot. Capt. C. Goodsell, recently stationed at Selfridge Field, also is associated with the new company.

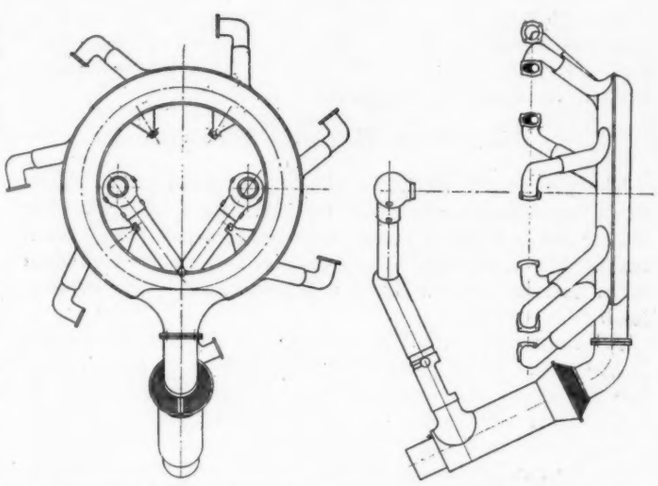
One hour service to Cleveland, two hour service to Chicago, and five hour service to New York will be offered. New Stinson five passenger planes will be used. The concern also operates a service on Long Island, N. Y.

Nungesser, Coli, and Lindbergh Honored By Shaft Erected at Le Bourget Field, Paris

A MONUMENT was unveiled at Le Bourget Airport, Paris, on May 5 which honors the memory of Nungesser and Coli, French fliers who took off on that same day last year and were lost in an attempt to make a non-stop trans-Atlantic flight. The 10 ft. shaft, a gift to France from Robert Jackson of Concord, N. H., also commemorates the flight of Col. Charles A. Lindbergh, the inscription on the stone reading: "In Honor of Those Who Attempted and Him Who Succeeded." The monument stands at the point of take off of the Nungesser-Coli plane.

Exhaust Rings are Provided as Standard Equipment on the Ryan-Siemens Engines

THE EXHAUST ring provided as standard equipment on Ryan-Siemens engines, distributed by the Ryan Aeronautical Corp., San Diego, Calif., is in front of the cylinders, fairing into the cowling on the plane and providing the proper streamlining in front of the cylinders to give even cooling. It consists of an angular ring with vents connected to the exhaust ports of the cylinders. The gases leave at the bottom of the annular ring through pipe carried below the engine. This is surrounded by a hot air stove with a screened opening, which is the carburetor intake, facing forward giving a slight amount of supercharging effect. There is an adjustment above the stove to allow a regulation for the amount of air being drawn in by the carburetor.



Exhaust manifold system of the seven cylinder, 100 hp. Ryan-Siemens engine. Note the heater stove and the connection to the carburetors fitted with a by-pass.

The system is said to reduce the noise and because of its arrangement reduces the fire hazard. It is made up of thin sheet iron with the annular ring in two halves stamped out with the seams welded together. The individual exhaust pipes are welded to the ring and a slip joint is provided to allow for expansion and contraction. The complete system, with preheaters, weigh 13 lb., 16 lb., and 20 lb. for the five, seven, and nine cylinder engines, respectively.

Hamilton Metalplane Co. Billboard Displays Attract Attention in Detrot During Show

LARGE BILLBOARD display advertisements of Hamilton Metalplanes, manufactured by the Hamilton Metalplane Co. of Milwaukee attracted much attention in Detroit during the All-American Aircraft Show. The advertisements were in three colors and incidentally urged the public to patronize the air mail.

As far as can be learned this is the first outdoor poster display advertising of an airplane manufacturer in the United States.

New Nine Cylinder Radial Engine Developed By Capt. R. W. A. Brewer is Block Tested

CAPT. R. W. A. BREWER has developed a nine cylinder, air cooled, radial engine with the financial backing of Harold F. Pitcairn, president of Pitcairn Aviation, Inc., of Philadelphia, Penna. The engine has been block tested and is rated at 164 hp. at 1800 r.p.m. It weighs 445 lb. complete with all accessories excluding starter. Under full load, at rated speed, the fuel consumption is .47 lb. per hp. hr. which is equivalent to about 13.1 gal. per hr. This figure is very low for full power performance.

The engine is of conventional design having nine, fixed radial cylinders of cast iron with a bore 4¼ in. The stroke is five inches giving a displacement of 630 cu. in. The cylinders are bolted directly to the crankcase by four studs. They were designed with hemispherical heads having both intake and exhaust manifold connections in the rear. All valves are actuated by push rods driven from a single cam ring in front of the crankcase. The upper ends of the push rods are housed in an aluminum box protecting the rocker arm and valve mechanism. The tappet levers can be adjusted without removing the box cover.

Uses Norma-Hoffmann Bearings

The pistons are aluminum alloy with dished heads. They drive the connecting rods made of duralumin forgings. The master rod is a single piece necessitating a two piece crankshaft. The crankshaft is mounted on two Norma-Hoffmann roller bearings while a larger ball bearing takes the propeller load.

All accessories, except for the valve mechanism, are carried in the rear. These include a Zenith carburetor mounted below the engine and connected to a rotary diffuser driven directly from the crankshaft. Also mounted on the so-called accessories carrier, are two Scintilla magnetos driven indirectly by two gears meshing with a pinion on the end of the crankshaft. These gears also drive two Viking oil pumps, one pressure pump and one scavenger pump. A third gear meshing with this pinion is connected to a mount for an Eclipse starter.

Though these engines have performed very well under tests they are not yet in production and plans for their manufacture have not yet been announced.

Chicago-Atlanta, St. Louis-Kansas City, and Michigan Air Mail Route Bids are Opened

BIDS FOR three additional air mail routes were recently opened in the office of Second Assistant Postmaster General W. Irving Glover. The first of these routes will run from Chicago, Ill., to Atlanta, Ga., via Terre Haute, and Evansville, Ind., Nashville and Chattanooga, Tenn., with a spur from Evansville to St. Louis, Mo., giving the latter city a connection with Atlanta and later with Florida and Cuba.

The second route will extend from St. Louis to Kansas City, Mo., and Omaha, Neb. The schedule, however, will not synchronize with the Evansville-St. Louis route.

The third route will cover the State of Michigan like a blanket, running from Chicago, Ill., to Kalamazoo, Mich., via South Bend, Ind.; to Bay City, via Lansing, Flint and Saginaw, with spurs branching out from Kalamazoo to Pontiac, via Battle Creek, Jackson, Ann Arbor, and Detroit, and to Muskegon via Grand Rapids.

Bids received on the Chicago-Atlanta route were as follows:

United Airways, Inc., Detroit, Mich.: $2.50 per lb.

Robert L. Harter, Hinsdale, Ill.: 90 cents per lb.

Page J. Thibodeaux and Joseph H. Carr, Lake Forest, Ill.: $1.45 per lb.

Sievert Aircraft Corp., Chicago: $2.02 per lb.

Egyptian Transportation System, Marion, Ill.: a sliding scale bid ranging from $1.80 to $2.80 per lb.

E. W. Romberger, Atlanta, Ga., $1.05 per lb.

The following bids were received on the St. Louis-Omaha route:

Robertson Aircraft Corp., St. Louis: 78.5 cents per lb.

Albert Von Hoffmann, St. Louis: $2.45 per lb.

Boeing Air Transport, Inc., Seattle, Wash.: $1.50 per lb.

Western Air Express, Inc., Los Angeles: $1.95 per lb.

Bidders on the Chicago-Michigan points route were:

Thompson Aeronautical Corp., Cleveland, O.: 89 cents.

Walter T. Varney, Wilmington, Del.: $2.23 per lb.

United Airways, Inc., Detroit, Mich.: $1.75 per lb.

Ralph A. Beale of Beale Aircraft Co. Brings Out New Monoplane in Kansas City

A NEW airplane factory has been started in Kansas City by Ralph A. Beale, president of the Beale Aircraft Co. A new plane, with several distinctive features, designed by Mr. Beale, will be placed on the market by the company.

The machine, a monoplane with an OX-5 water cooled engine, has a cabin for two passengers and a pilot. In the test flights Mr. Beale, who was a war pilot, rose 10,300 ft. in 25 min. Another test was made by Blaine M. Tuxhorn, veteran commercial pilot, who took the plane up with a full load 1000 ft. with only one circle of the field and a short take off.

The expansion division of the Chamber of Commerce is taking an interest in the new plane and cooperating in the establishment of the factory. The plane is to be sold, it is said, for $2,400.

Stinson Company Delivering First of Six Planes Ordered by Mexican Government

THE FIRST of six Stinson monoplanes ordered by the Mexican Government in March to be used on the air mail line between Mexico City and Laredo, Tex., has been turned out by the factory at Detroit for immediate flight-delivery south, according to William A. Mara, secretary of the Stinson company.

The plane is being flown to Mexico City, where the pilot, not yet selected, will remain to instruct the Mexican pilots in flying the plane. The five remaining planes of the order will be flown only to Laredo, Tex., where Mexican fliers will take them over. The order for these planes came from Mexico on the day Eddie Stinson and George Haldeman broke the world's endurance record at Jacksonville, Fla.

Miss Rasche's Order for a Trans-Atlantic Plane is Rejected by the Stinson Company

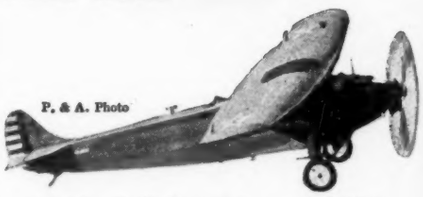
BECAUSE OF the policies of the company forbidding the manufacture of Stinson planes intended for lengthy ocean flights, the Stinson Aircraft Corp. of Detroit, Mich., recently returned a check for approximately $4,000 to Miss Thea Rasche, German aviatrix, as a deposit on a Stinson monoplane to be used in a proposed trans-Atlantic flight this summer.

William A. Mara, secretary of the company, said Miss Rasche has since purchased a Stinson plane, the "Adelaide", from Louis Solomon, New York flier, who bought the plane from the Detroit company last summer for an endurance attempt. The Stinson company has rejected a number of such propositions, Mara said.

Fokker
Super Universal

ANTHONY H. G. FOKKER speaks with authority. His long experience as a master builder of airplanes is reflected in this letter.

Fokker
Standard Universal



P. & A. Photo

Maitland's Valsparred Fokker made the long and quick hop over the Pacific—clear from the mainland to Honolulu.

Fokker
C-2
Trimotor

Fokker
Universal
Seaplane

A Fokker flying boat—Valspar is used because it is water-proof and weather-proof

U. & U. Photo

Fokker
F
VII

The first airplane to fly to the Pole—Valsparred, of course! For Valspar is never affected by extremes of temperature.

Pan-American
Fokker
F VII
Trimotor

Fokker USA has used VALSPAR for 10 Years

CABLE ADDRESS:
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Fokker USA

CONTRACTOR TO THE UNITED STATES GOVERNMENT

ATLANTIC AIRCRAFT CORPORATION

DESIGNERS AND MANUFACTURERS OF AIRCRAFT

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NEW YORK CITY, N. Y.
PHONE ASHLAND 9160

FACTORY AT
TETERBORO AIRPORT
HASBROUCK HEIGHTS, N. J.
PHONE HASBROUCK HEIGHTS 900 & 911

PLEASE ADDRESS REPLY TO The Corporation at Hasbrouck Heights, N.J.

December 1, 1927.

Valentine & Company,
455 Fourth Avenue,
New York, N.Y.

Gentlemen:-

As you know the Atlantic Aircraft Corporation has been a staunch believer in Valspar Varnish for a number of years.

Few people realize how vital a part the finish plays in the durability of an airplane. If proper protective covering is not used, the airplane gathers moisture, thereby reducing greatly its efficiency and life.

The results obtained from the use of Valspar on FOKKER planes built in the last ten years have been so eminently satisfactory that it is a pleasure to recommend your good varnish. We employ it on our flying boats, as well as on our regular airplanes. It has recently been used on a customer's especially designed and constructed flying yacht. We have other customers who distinctly specify Valspar in their contracts.

Yours very truly,

ATLANTIC AIRCRAFT CORPORATION,

BY: A. H. G. FOKKER.

AHGF-HKS

All statements or agreements contained in this letter are contingent on strikes, accidents, fires or any other causes beyond our control and all contracts are subject to approval by the signature of a duly authorized executive officer of this company; clerical errors subject to correction. Specifications, guarantees and delivery dates subject to change without notice.

VALSPAR is depended upon by the aircraft industry generally, to give the needed protection against moisture, extremes of temperature, vibration, gas and oil. Valspar increases efficiency and the life of planes.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

REVIEWS

The Book Department, Aviation, 250 West 57th St., New York City can supply all books mentioned except government publications. N.A.C.A. publications may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Army Air Corps Information Circular No. 599. Design of Internally Braced Wings by E. C. Friel.

The report includes the design and stress analysis of a typical tapered wing. The complete analysis of the Huff-Daland AT-1 training plane wing is carried through with lift struts and cabane struts also analyzed. No attempt is made to describe methods of detail design but to merely compute the dimensions of the critical sections of the internally braced wing structure.

Army Air Corps Information Circular No. 602. Determination of Stresses in Landing Gears and Design of Shock Absorbing Units Part I by Theo. de Port.

The report deals with the design of shock absorbing units and with methods for the determination of deceleration on landing gear units already designed. Types of shock absorbing units considered are: tires without any other shock absorber and tires and rubber chord in tension.

Aircraft Year Book, 1928, published by the Aeronautical Chamber of Commerce, New York City, 550 pages $5.25.

The tenth successive volume of the annual recording of aeronautical progress for the past year contains invaluable information and statistical data on both commercial and military aviation throughout the world. There are 80 illustrations and 60 pages of designs and maps. The noteworthy flights of 1927, both American and foreign, are recorded in detail. The influences of these flights on civil aviation is discussed followed by a description of the activities and equipment of all of the air mail contractors. Statistics are recorded on the private and commercial operation of airplanes as well as some of the special applications of aircraft during the past year. A chapter is devoted to government aviation recording the activities and progress of each branch, the Army Air Corps, the Navy Bureau of Aeronautics and the Department of Commerce.

Under "Airports and Airways" are listed the lighted and unlighted airports by states. Airship and balloon developments, races and records are described followed by a chapter on aeronautical education in the United States. There is a chapter on foreign aeronautics describing the progress in each country. This is followed by an international aeronautical chronology. There is a chapter on technical developments and another on the aeronautical industry listing the activities of each company. This is followed by a section including drawings of airplanes, engines and accessories. The appendix includes lists of pilots, operators, aviation chambers of commerce, airport managers, as well as statistics and data on air races, records, competitions, air mail operations, Department of Commerce, Army, Navy, production, etc.

N.A.C.A. Report No. 282. The Performance of Several Combustion Chambers Designed for Aircraft Oil Engines. By William F. Joachim and Carlton Kemper. Several investigations have been made on single cylinder test engines to determine the performance characteristics of four types of combustion chambers designed for aircraft oil engines. Two of the combustion chambers studied were bulb-type precombustion chambers, the connecting orifice of one having been designed to produce high turbulence by tangential air flow in both the precombustion chamber and the cylinder. The other two were integral combustion chambers, one being dome-shaped and the other pent-roof-shaped.

The injection systems used included cam and eccentric driven fuel pumps, and diaphragm and spring-loaded fuel-injection valves. The data presented show the performance for speeds from 600 to 1,800 r.p.m. The results obtained indicate that aircraft-type oil engines with suitably designed combustion chambers and fuel-injection systems may be operated at speeds around 1,800 r.p.m. without encountering excessive explosion pressures.

At a speed of 1,600 r.p.m. and with a fuel quantity giving 15 per cent. excess air in the cylinder, a maximum i.m.e.p. of 119 lb. per sq. in. was obtained with a fuel consumption of 0.43 lb. per i. hp. per hr. The maximum cylinder pressure was 740 lb. per sq. in. A minimum fuel consumption of 0.26 lb. per i. hp. per hr. at an i.m.e.p. of 52 lb. per sq. in. and 1,600 r.p.m. was obtained with a cylinder head having a bulb-type precombustion chamber. The maximum cylinder pressure was 560 lb. per sq. in. The best performance for the tests reported was obtained with a bulb-type combustion chamber designed to give a high degree of turbulence within the bulb and cylinder.

Aircraft Patents

Patent No. 1,665,886—GAS-INFLATED AIRSHIP. Eberhard Lemperts, Friedrichshafen, Germany, assignor to Luftschiffbau Zeppelin Gesellschaft mit beschrankter Haftung, Friedrichshafen, Germany. 10 Claims. An airship comprising a structure adapted to be inflated with gas; a motor to propel said structure; a gas contained in said structure and being of lower specific gravity than air; a second gas contained in said structure and having a specific gravity substantially alike that of air.

Patent No. 1,666,112—AIRSHIP. Barnes Neville Wallis, Westminster, London, England, assignor to Airship Guarantee Co., Ltd., London, England, 8 Claims. A hydrogen gas bag for an airship provided externally with a surrounding envelope comprising inner and outer walls and partitions which serve to connect together said outer and inner walls, some of said partitions being gas-tight and some nongas-tight.

Patent No. 1,666,132—AEROPLANE. Maurice Gallet and Adolph B. Anderson, Poughkeepsie, N. Y. 3 Claims. In an aeroplane, a body comprising a pair of longitudinally extending tubular side members, the bottoms of which adjacent their rear ends are depressed, to form compartments and turbines journaled in the side members so that their blades move longitudinally of the side members and in the compartments, being actuated by currents of air through the side members.

Patent No. 1,666,315—HELICOPTER. Henry A. Shuman, Fairbury, Nebr. 3 Claims. In a helicopter, a plane mounted for reciprocatory movement in vertical directions, and a plurality of slat valves pivotally secured to said plane and normally inclined thereto when they are in their opening position, some of said valves being angularly adjustable so that all of said valves may be parallel with each other or so that some of said valves may be oppositely inclined with reference to the others of said valves.

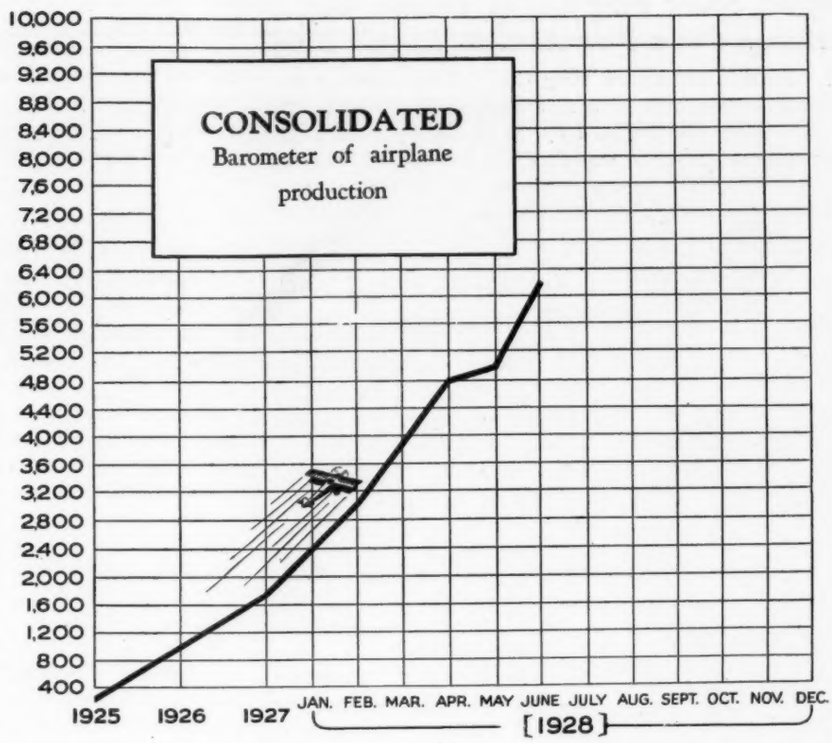
Patent No. 1,666,354—AIRSHIP-LANDING STATION. Frelerick William Schwerdtfeger, New York, N. Y. 7 Claims. A station for landing and launching airships, comprising a circular hangar, a pillar centrally located within the hangar, a number of radial tracks placed on the hangar-floor and rotatable around said central pillar, a movable mooring tower situated on a circular track placed on the periphery of the hangar-roof and an elevator device from the hangar-floor to the hangar-roof.

Patent No. 1,666,456—PARACHUTE CONTAINER AND EJECTOR FOR AEROPLANES. Joseph La Porte, Lomita, Calif. 6 Claims. In the art described, the combination of an aeroplane having a container, a parachute housed therein, with an air passage through the aeroplane to the container to eject the parachute.

Patent No. 1,666,761—COMBINATION SEAT AND CONTROL MECHANISM FOR AIRCRAFT. William Wait, Jr., Garden City, N. Y., assignor to Curtiss Aeroplane & Motor Co. 12 Claims. The combination, in an aeroplane, of a vertically adjustable seat, a control surface operating device adjustable toward and away from said seat, and a connection extending between said seat and said device whereby the adjustment of the one is made responsive to the adjustment of the other.

Patent No. 1,666,769—AIRPLANE. Rex B. Beisel, Garden City, and William L. Gilmore, Mineola, N. Y., assignors to Curtiss Aeroplane & Motor Co. 9 Claims. In an airplane, superposed supporting surfaces, each said supporting surface comprising a like number of panel sections, and each corresponding panel section being the same in surface shape and in dimensions whereby an interchange thereof will in no way alter the design of the airplane considered as a whole.

THE accompanying chart visualizes the constant growth of airplane production . . . and the present approximate rate of manufacture (planes per 12-month period) . . . as indicated by the current delivery schedule of Consolidated Instruments.



Consolidated Instruments are Standard on the Sikorsky Amphibian

TYPE F Star Pathfinder compass, flush mounting, with easily accessible compensating unit.

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CONSOLIDATED tachometers, altimeters, air speed indicators, oil pressure gauges, temperature gauges—and also Consolidated navigation lights — are standard equipment on the beautiful Sikorsky Amphibian, one of America's most distinctive planes.

Quantity production, resulting from the fact that one or more Consolidated Instruments is standard equipment on most American commercial airplanes, makes possible the moderate prices of our dependable quality products.

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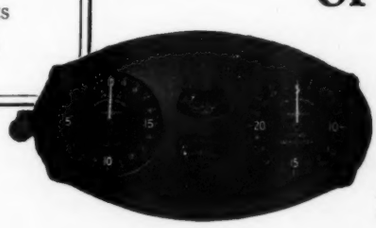


CONSOLIDATED aircraft instrument panel Type A; dependable instruments effectively grouped in indirect illumination.

Champion Spark Plug Co. of Toledo, O., Brings Out a New Aircraft Engine Plug

THE CHAMPION Spark Plug Co., Toledo, recently announced the development of a new aviation spark plug, the AE-9. The plug was designed by O. C. Rohde, chief engineer for the company. It was designed for operation under extreme conditions such as sudden changes from part to full throttle, ignition off and back full throttle as in certain maneuvers, varying weather conditions, etc. The plug employs sillimanite to overcome the objections to porcelain. This material is said to be exceptionally hard and strong and the plug is so designed that should it break it will still hold together and continue to function. In the AE-9 there have been incorporated some new principles of core design. In place of the standard straight top with the electrode cemented through the plug's entire length, the AE type uses two pieces of insulation. The first is a primary core with sufficient electrical clearance at the top to be safe. The second is a protecting and covering dome of sillimanite which encloses the primary core and, in addition, adds to its insulating length.

The new Champion Spark Plug.

Experimental plugs of this design have been in use for some time. They were in the Wright Whirlwind engine of the Travel Air monoplane used by Smith and Bronte on their flight from San Francisco to Hawaii last summer and by Martin Jensen who finished second in the Dole Prize flight to Hawaii. Last year Maj. Mario de Bernardi used these plugs in a Macchi Fiat plane when he set a world's speed record in Venice, Italy. In December Maj. Renato Donati established a world's altitude record using a Romeo-Jupiter engine with Champion spark plugs.

Jacques Schneider, Seaplane Race Trophy Donor, Dies at Beaulieu-sur-Mer, France

REPORT HAS been received from France that Jacques Schneider, French sportsman who donated the international seaplane speed trophy which bears his name, died on May 1 at Beaulieu-sur-Mer. He was 50 yr. old.

M. Schneider presented the racing cup to the Aero Club of France in 1912 for the purpose of developing marine aircraft through competition among the nations in annual races. Marcel Prevost of France first won the Schneider Cup Race when he attained about 60 m.p.h. in 1913. England took the cup the following year.

During the war, the races were suspended to be begun again in 1920 when Italy took the trophy. The Italian fliers again won in 1921, but England regained the cup in 1922 only to lose it in 1923 to the United States. The race was cancelled in the year that followed because the English and Italian airmen were unable to get their planes ready in time.

In 1925 Lieut. James Doolittle, United States flier, kept the Schneider Cup in this country by turning in a speed of 232.57 m.p.h. De Bernardi of Italy surpassed this mark by flying 258.48 m.p.h. in 1926 to take the cup. The trophy is now held by England, Lieut. S. N. Webster having flown 281.48 m.p.h. at Venice last September.

Since the last races, Major de Bernardi of Italy has been credited with two seaplane speed marks bettering that of Webster. On Nov. 5, 1927, de Bernardi flew 298 m.p.h., and on March 30, 1928 he attained 318.57 m.p.h. over the Lido course at Venice in his Macchi M.52 Fiat engined plane.

Howard Woodall Flying an OX-5 Travel Air Is High Point Man in Dallas, Tex., Meet

A TWO day air meet recently held in Dallas, Tex., proved successful despite inclement weather which prevented several visiting planes from arriving for the competition. Some 15,000 spectators were attracted to the field on the opening day.

Howard Woodall piloted his OX-5 Travel Air to high honors by winning the greatest number of points during the two days. In every event in which he entered, Woodall placed.

The $2,500 in prize awards was distributed among winners in the various events, who placed as follows:

Race, limited to planes of 90 hp. (11 entries)
1st. Louis E. Derryberry, Abilene, OX-5 Travel Air.
2nd. Howard Woodall, Dallas, OX-5 Travel Air.
3rd. Ross Arnold, Fort Worth, OX-5 Travel Air.

Spot Landing Contest. (13 entries)
1st. Howard Woodall, Dallas, OX-5 Travel Air.
2nd. Ross Arnold, Fort Worth, OX-5 Travel Air.
3rd. Merrel Brock, Dallas, OX-5 Jenny.

Free For All Race. (Six entries)
1st. Jack Lanier, Shreveport, Vought VE-9, Hisso.
2nd. Reg Robbins, Fort Worth, Whirlwind Ryan Brougham.
3rd. Al Henley, Fort Worth, Huff Daland (Bug Duster) Hisso.

Aerobatics. (Six entries)
1st. (tie) Merrel Brock, Dallas, OX-5 Swallow.
Herbert Kindred, Dallas, OX-5 Travel Air.
3rd. Howard Woodall, Dallas, OX-5 Travel Air.

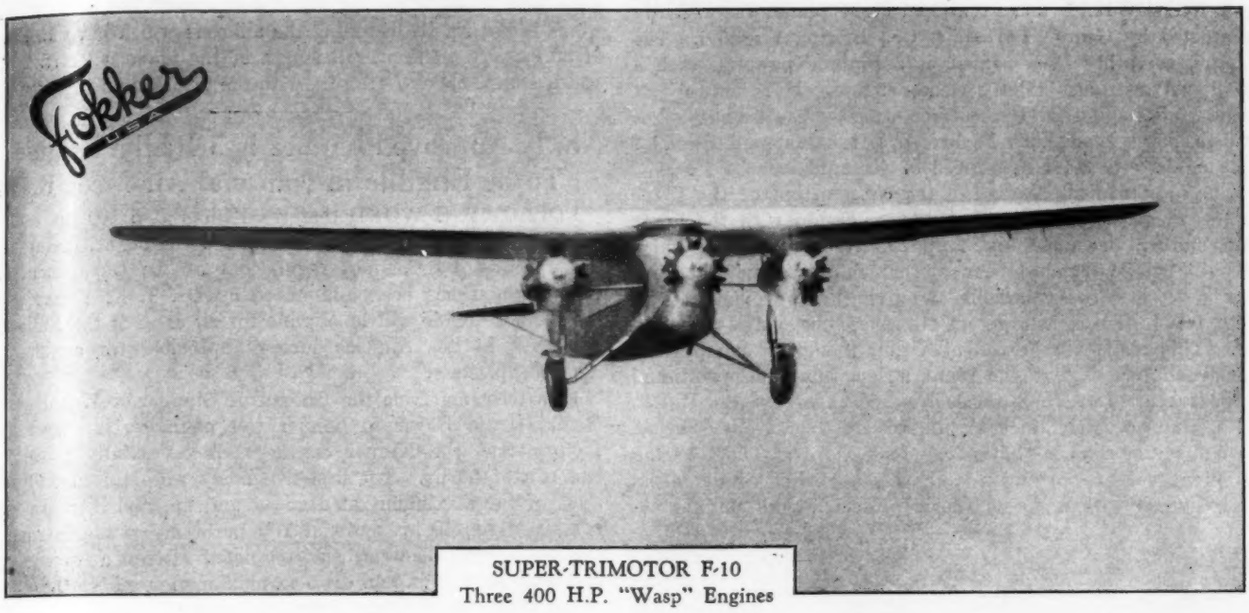
The On-To-Dallas prize was won by a pilot from Cincinnati flying an OX-5 International. He slipped away before his name was obtained. The meet was closed with a balloon ascension by R. M. Dowley.

New Three Place Biplane Using the OX-5 Is Built by M. C. Armel in Athens, Ga.

A CONVENTIONAL three place biplane has been completed at Athens, Ga., and has been tested and found to be exceptionally stable. The plane was designed by A. H. Comer and financed and built by M. C. Armel of that city. It is an open cockpit design powered with an OX-5 engine. In construction, it has a welded steel tube fuselage and tail surfaces while the wings are of wood covered with fabric. A through axle type of landing gear is used with the radiator below the fuselage and braced to the landing gear struts. The plane is stated to weigh 1100 lb. empty and 1750 lb. loaded and to have a top speed of 95 m.p.h. with a landing speed of 35 m.p.h.

Lunkenheimer Company of Cincinnati, O., Publishes Booklet on Aircraft Fittings

"LUNKENHEIMER Air Craft Fittings" is the title of a small book now being distributed by the Lunkenheimer Company of Cincinnati, O. It gives complete engineering information and drawings showing the principal dimensions of the various types of Lunkenheimer aircraft fittings which include all kinds of pipe fittings, primer fittings, shut-off cocks, and drain cocks.



SUPER-TRIMOTOR F-10
Three 400 H.P. "Wasp" Engines

Fokkers for Success!

IT is not a coincidence that the most successful air lines use Fokkers. Some owe their success to the fact that they equipped themselves with the dependable Fokker from the start. Others have achieved success through sound judgment and good management in their operations, and then . . . this same leadership points the way to the purchase of the latest Fokker Aircraft.

Notable examples, in widely different fields, are the Western Canada Airways, Ltd., of Winnipeg, Manitoba, and the Pan-American Airways, Inc., of Key West and Havana. Both use Fokker Aircraft!

And now, Western Air Express, the greatest demonstrator of the earning possibilities of air transportation, adopts the new Fokker Super-Trimotor F-10, the greatest Fokker ever built, . . . under the equipment loan made by the Daniel Guggenheim Fund for the Promotion of Aeronautics.

The new Fokkers are winging their daily schedule between Los Angeles and San Francisco, carrying 14 people, Pullman equipment, baggage and 500 lbs. of mail, in luxury and safety, at magic-carpet speed!

Making 150 miles an hour under the full power of its three Pratt & Whitney "Wasp" engines, over 120 miles an hour at that reduced throttle which means complete reliability and minimum wear and tear, and 1,400 feet per minute climb with full load: such performance sets, in the Fokker F-10, new standards for the world first to gasp at, then to follow.

Specification on Executive Request

ATLANTIC AIRCRAFT CORPORATION
Factory and Flying Field
Teterboro Airport, Hasbrouck Heights, New Jersey
Subsidiary of FOKKER AIRCRAFT CORPORATION OF AMERICA, *Wheeling, West Virginia*

Copyright 1928 by A.A.C.

New Light Biplane With Cantilever Wings Built in England by George Parnall & Co.

A SOMEWHAT unconventional light plane was recently completed by George Parnall & Co., Bristol, England. The "Imp", as it has been named, is a biplane powered with a 65 hp. Armstrong-Siddeley Genet engine. It is entirely of wood construction with cantilever wings. The plane weighs 850 lb. empty and 1,320 lb. loaded. It has a high speed of 102 m.p.h. with a landing speed of 40 m.p.h.

The most radical feature in the construction of the plane is the wings. They are of cantilever design with the lower wing built in one panel and supporting the upper wing which is built in two panels hinged at the center section. The upper wing has a considerable sweep back, approximately 15 deg., in addition to a large cut out where the panels are joined. This makes for excellent vision though it complicates construction and gives the plane a somewhat unconventional appearance. The wings themselves, which are of the R.A.F. 31 section—a fairly thick section with the center line curved to a medium camber—have four foot chords. The covering is spruce veneer, varying in thickness according to the stress and covered with undoped fabric protected with paint. Internally there are a number of light stringers replacing the usual two spar construction. Replacing the conventional type of rib are routed plywood formers spaced according to the local stresses in such a way as to make the compression loads. Because of the difficulty in making stress calculations for this type of structure a number of tests were made to determine the best spacing for the ribs and the proper thicknesses of the covering. The upper wing is said to have a load factor of 12 and the lower wing about 8. The wings do not fold but may be easily taken off by two people in a few minutes. There is no wire bracing and the only struts are the single tension member on each side.

The "Imp", new English light plane powered with 65 hp. Armstrong-Siddeley Genet engine.

Usual British Fuselage Construction

The construction of the fuselage follows usual British practice for planes of this type. It has four spruce longerons with the sides covered with plywood. Both sides and the bottom are flat while the top is convex with a light structure above the upper longerons. The upper longerons are quite high making for a deep fuselage. The two seats are placed in tandem with the forward one slightly behind the trailing edge of the upper wing. Both cockpits are fitted with stick control, the controls of the rear cockpit being connected directly to the ailerons which are on the lower wing only. These surfaces extend the entire span of the lower wing and like the tail surfaces are of wood construction.

The five cylinder, static radial, Armstrong-Siddeley engine is mounted on the nose of the fuselage on a frame supported by square tubes braced with angles. In the fairing in front of the forward cockpit is the main fuel tank feeding to the engine by gravity.

The landing gear is of the through axle type with the shock absorbers consisting of a combination oleo and helical spring unit. The travel is about five inches and the tread is 5 ft. 1 in.

The span of the Parnall Imp is 25 ft. 6 in. for the upper wing and 21 ft. 6 in. for the lower wing. The area of the wings is 176 sq. ft. including the ailerons which have an area of 30.7 sq. ft. The overall length of the plane is 21 ft. 2 in. and it stands about 7 ft. 9 in. with the tail skid on the ground.

Newly Approved Kinner K-5 Radial Engine To be Eligible in National Air Meet Races

FOLLOWING WORD that the Kinner K-5 100 hp. radial aircraft engine had successfully passed the 50 hr. endurance test specified by the new regulations of the Department of Commerce, it has been announced by Dr. T. C. Young that the Kinner engine will be eligible for all races at the National Air Meet in Los Angeles during September for engines in the 100 hp. class.

In a telegram from the Bureau of Standards, Washington, D. C., Leslie Bowman, Kinner test engineer, informed the factory that the Kinner engine had successfully passed a test run of 50 hr. The first five hours were run at 110 per cent. of the maximum rated speed and hp. and then the run continued for 45 hr. more at 100 per cent. of the maximum hp. and speed. The run was completed without a forced stop and with only 10 r.p.m. drop in maximum speed at the close.

According to Francis Brunner, assistant manager of the Kinner factory, several orders have been wired to the Glendale plant since the successful completion of this test. One order for 10 engines came from the Taylor Brothers Aircraft Corp., Rochester, N. Y., and a test order was placed by the American Eagle Airplane Co. of Kansas City.

Beacon Airways, Inc., Los Angeles, Plans Establishment of a Large Flying School

PLANS FOR establishment of one of the largest flying schools in the country were recently announced in Los Angeles by W. H. Franklin, president of Beacon Airways, Inc., a concern with offices in Los Angeles, Fresno, San Francisco, and Wichita, Kan. Immediate development of a large air field on Mesa Drive is now under way and it is at this field that the new flying school is projected.

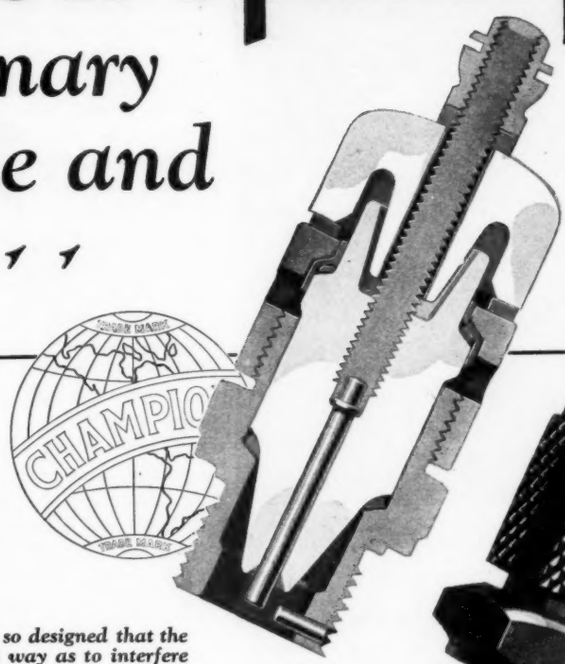
Beacon Airways now distributes the Cessna cantilever cabin monoplanes and the tri-engined Prudden monoplanes in the State of California. This company is also experimenting with a novel two passenger sport plane in an effort to offer the flying public a plane in every price class. The new plane is called the "Andia" and is said to have performed satisfactorily on test flights. It has a wing spread of 30 ft. and a total weight of 600 lb.

Alexander Milburn Co. of Baltimore, Md., Develops New Cutting and Welding Torch

THE ALEXANDER Milburn Co., Baltimore, Md., has developed a combination cutting and welding torch that can quickly be changed from cutting to welding without changing the tip. The convertible feature changes the TI torch by a turn of the tip. In one position the gases are automatically passed through the preheating passages while the high pressure oxygen is carried through the central hole for cutting. In the other position, made by a quarter turn of the tip, the cutting oxygen is cut off and the welding gases are conveyed through the central passage of the cutting tip, making a welding flame. Thus, this one torch can be used for both welding and cutting with practically no loss in time to make changes. The tip is so designed that when it has outlived its usefulness for cutting it can still be used for welding.

New Champion Aviation spark plug

Revolutionary in Principle and Design



The world's altitude and speed records were recently made with the help of the new Champion Aviation Spark Plugs.

ENTIRELY new principle of design • Exclusive sillimanite insulators—the finest insulating material known • Double insulation—primary protected by secondary "dome" insulator • Cooling areas around insulators • Champion two piece construction • Absolutely gas-tight against the highest compression ratio • *Entire structure so designed that the insulators cannot be broken in such a way as to interfere with engine operation.*

THE new Champion Aviation spark plug is not only a distinct innovation but is actually revolutionary in principle and design. It has already established new standards of spark plug performance in aircraft engines.

The unique design of the exclusive sillimanite insulators, in which the primary is protected by the secondary "dome" insulator, provides protection and cooling areas impossible in ordinary spark plugs. The entire structure is so designed that it positively cannot be broken in such a way as to interfere with engine operation. Pre-ignition and "cutting out" are practically impossible.

Developed after two years of painstaking research and rigorous tests, the new Champion Aviation spark plug further embodies all the excellence in material and manufacture exclusive to all Champion spark plugs.

Install a complete new set of Champion Aviation spark plugs which bring to your engine a new factor of safety and vastly improved performance and dependability.

Write for descriptive folder

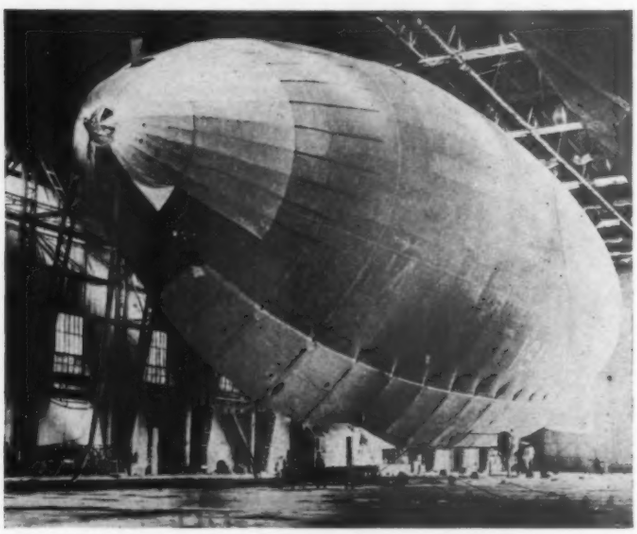
CHAMPION *Spark Plugs*

TOLEDO, OHIO

General Nobile at Kings Bay, Spitzbergen, Ready for Arctic Flights in the "Italia"

HAVING LANDED his semi-rigid dirigible "Italia" at Kings Bay, Spitzbergen, on Sunday May 6, Gen. Umberto Nobile is now preparing for several flights into the North Polar regions following a program which will consume the remainder of the spring and a large part of the summer.

The purpose of the flights is to gain a more scientific knowledge of the Arctic sections of the globe. A search is to be made for Crocker's Land, a tract which MacMillan was unable to find in 1914 though Peary believed he discovered such a section in 1909; and another flight will be made to the opposite side of the Pole to learn, if possible, more about Nicholas II. Land north of the peninsula of Tainir, which was discovered by a Russian expedition under Captain Wilkiski in 1913.



The "Italia" in its hangar just outside of Rome, before the flight north.

Nobile's ice breaking ship *Citta di Milano* arrived at Kings Bay, Spitzbergen, on Wednesday May 2. This ship will be used as a base from which the various flights will be made. The Italia will carry a score of men on its explorations, many of whom will be veterans of the Amundsen-Ellsworth-Nobile flight over the North Pole in 1926 in the "Norge". The *Citta di Milano* will carry a large crew of men for the handling of the dirigible.

Stormy Weather Encountered

Much stormy weather has been encountered by General Nobile in his flights from Milan, Italy, to Spitzbergen. Early April 15, the Italia left Baggio Field, near Milan, and was headed toward Venice, Trieste, and Prague on its flight to Stolp, Pomerania. Heavy weather, especially characterized by strong head winds which lowered the speed of the dirigible to 15 m.p.h. in some sections, was met en route. The normal cruising speed of the Italia is 62 m.p.h.

After losing his way over Brunn, Czechoslovakia, and again finding his course from radio reports, General Nobile continued his journey and landed at Steddin Airdrome, near Stolp, on April 16. The 680 mi. flight had taken 30 hr. 40 min.

A two week's halt followed; then on May 3 the trip north was continued with a 1,500 mi. flight of 29 hr. duration to Vadsoe on the northern coast of Norway. In his flight, Nobile was again lost, this time over the Gulf of Bothnia. He circled for several hours, it is reported, until the radio again informed him of his position. The envelope of the Italia was slightly damaged in landing at the mooring mast at Vadsoe.

With the envelope repaired, the General continued on May 5 to Spitzbergen, where he landed next day. This flight of 550 mi. was made in 16½ hr.

Robertson Aircraft Corp. and Thompson Aeronautical Corp. Get Mail Contracts

POSTMASTER GENERAL New has awarded to the Robertson Aircraft Corp. of St. Louis, Mo., the contract for operating the air mail route from St. Louis, via Kansas City, Mo., to Omaha, Neb., and return. The bid of this firm which was the lowest received, was for 78½ cents a pound. This is the lowest rate for carrying the mails over any route at present in existence, and, in the opinion of the Postmaster General, indicates that the business of carrying the mails by air is becoming a profitable one to private contractors.

The Thompson Aeronautical Corp. of Cleveland, O., was also awarded the contract for carrying the mails by air over the route from Chicago, Ill., to Kalamazoo, Mich., via South Bend, Ind., to Bay City, via Lansing, Flint and Saginaw, with spurs branching out from Kalamazoo to Pontiac, via Battle Creek, Jackson, Ann Arbor, and Detroit, and to Muskegon, via Grand Rapids. The bid of this firm was 89 cents a pound, and was the lowest received by any of the companies submitting bids.

The route from St. Louis to Omaha will not be placed in operation for several months as it will require the lighting of the airway for night flying. The route from Chicago to Indiana and Michigan points will commence operation during the early part of the summer or just as soon as the contractor can make arrangements for landing fields and place his equipment in condition for mail carrying.

New Type of Wind Indicator is Installed At the Oakland, Calif., Municipal Airport

AN UNUSUAL type of wind indicator has been installed at the Oakland Municipal Airport, Oakland, Calif. It is shaped like a small monoplane, has a wing spread of 12 ft., a 16 ft. fuselage, and is outlined with Neon lighting. The airplane-vane is mounted on a 20 ft. tripod, over the directional marker which is located in the southeast corner of the field. The Neon lights make the indicator visible at night for many miles, and it can be seen through a fog from a 2,500 ft. altitude.

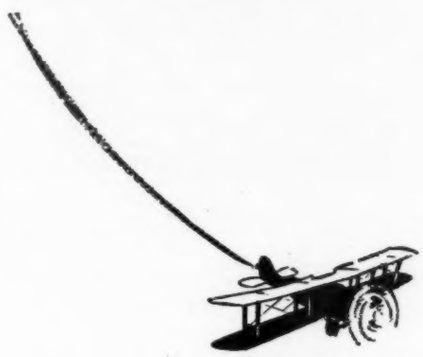
Members of the Oakland port commission ordered installation of the indicator, and the contract for designing and constructing the novel equipment was given to the Aircraft Industries, San Leandro. Other airports are expected to adopt the new style vane.

DH Moth With Slotted Wings is Displayed By Air Associates, Inc., at Curtiss Field

AIR ASSOCIATES, Inc., of New York City has purchased a DH Moth plane equipped with slotted wings and is now exhibiting it at Curtiss Field, L. I., N. Y. Mr. Handley-Page, now visiting in America, has visited the field and explained the use of the slotted wing device to a few who have viewed the plane.

It is understood that Air Associates, Inc., plans to enter the Moth in the 1928 Ford Reliability Tour with James B. Taylor as pilot. The company's price for the plane is $6,000.

BOEING



THE Boeing Airplane Company is planning for that time, which is eventually coming, when airplanes will be an accepted mode of speedy transportation, rather than the unusual. A staff of fifty to sixty aeronautical engineers, constantly employed in research, gives some indication of the extent to which the future is receiving attention.

This research is evolving economies in production .... greater safety .... lower operating costs .... higher speeds.

Boeing Airplane Co.

Seattle, Washington

Mail by Air and Speed it There

Last Minute Briefs

Andy Carisi is building a plane of his own at Lindenhurst, L. I.

The Fairchild monoplane flying boat with folding wings is expected to be finished by June 1.

A national aircraft show is planned by San Leandro, Calif., to be held sometime this September.

Prof. Hugo Junkers, designer and builder of aircraft bearing his name, has arrived in America.

Breeze Aircraft Co., San Francisco, Calif., is again in production and plans to complete two planes in May and increase production each succeeding month.

Franklin Rose and Sam Metzger, Oakland, Calif., pilots, have taken the agency for the Stearman planes. They will be sub-dealers for Walter Varney of the Varney Airlines.

The Mexican Government expects to be ready to establish air mail service between Mexico City and Nuevo Laredo by June 1, it has been announced.

Charles Prohinsie, Curtiss Field, Long Island, N. Y., has completed his first plane and plans to start production very shortly. It is an OX-5 open cockpit biplane with many original features.

Passenger fares between Chicago and Kansas City by air have been reduced from 14 to 10 cents per mile by the National Air Transport, Inc. The new rate is $45 between these points.

Arrangements have been made for two 200 x 100 ft. tents at Wold-Chamberlain Field, Minneapolis, to house the First Annual Northwest Aircraft Show to be held May 24-27. The charge for exhibition space is $1 per square foot.

Miss Thea Rasche, well-known German aviatrix, has also come to this country. She plans to fly back to Germany in the "Adelaide," a Stinson-Detroiter monoplane she has purchased from George Weis, New York pilot.

Pacific Technical University of San Diego, Calif., has opened its Residence School in which practical instruction on the latest type of planes and engines is now being given. The institution is affiliated with the Ryan Flying School.

The Chesapeake Aircraft Corp. of Baltimore, Md., has been reorganized with capital increased to $50,000. The company's field was recently opened. It lies adjacent to Logan Field in Dundalk.

Secretary of War Wilbur has appointed Rear Adm. William H. Standley of the Bureau of Operations to head a board to investigate ways and means to develop more safety in Naval aviation.

Work on New York City's municipal airport on Barren Island is to start in a few weeks, according to an announcement by Albert B. Hager, president of the Flatbush Chamber of Commerce.

The Junkers Company in Germany recently completed a low wing monoplane powered with a Bristol Jupiter engine for New Guinea Gold Co. for operation over the rough terrain in New Guinea.

What is believed to be the first commercial slotted wing plane in the United States was flown last week at Curtiss Field, Long Island, N. Y. It is a De Havilland Moth, Cirrus engine, imported by Air Associates, Inc. The plane was tested in the presence of Handley-Page, designer of the slot.

The Wisconsin Flying Club was recently formed in Milwaukee, A. A. Waitkus, Frank Bartis, and Frank J. Scherschel being the incorporators. A Lincoln-Page biplane has been purchased by the organization, which will act as dealer for that plane in Southern Wisconsin.

The new Bristol "Titan" engine, a five cylinder radial developing 220 hp., is undergoing tests in an Avro training plane in England. This engine was developed primarily to compete with the Wright Whirlwind. A geared version of the same engine is now under construction.

Post-mortem award of the world's record for the longest flight in a Class C single place airplane has been made to Harry J. Brooks, Ford pilot lost in the ocean off Florida. Brooks flew the small Ford plane 972 mi. from Detroit to Titusville, Fla., last February.

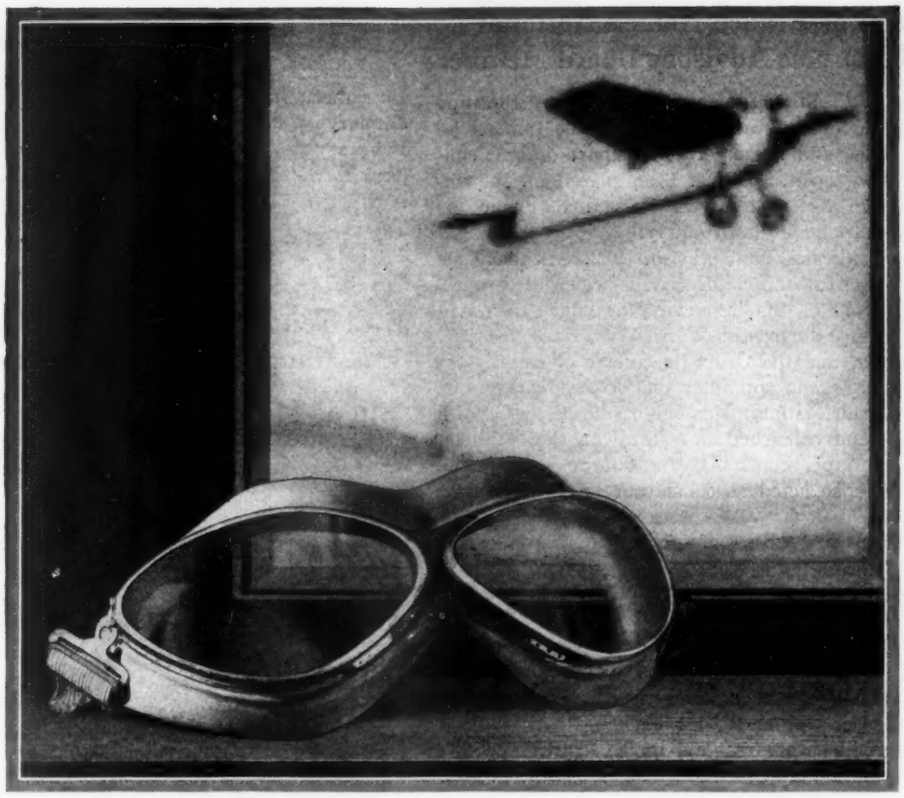
Three 240 hp. Hispano-Suiza engines have been substituted for the three 180 hp. power plants of the same make originally placed on Rene Couzinet's plane, described in the April 30 issue of AVIATION. Greater power was needed for the monoplane which the French pilot plans to use this summer in a trans-Atlantic attempt.

Lights for the western half of the transcontinental and other western airways have been purchased by the Department of Commerce, the Aeronautic Branch announces. The San Francisco-Salt Lake City section of the transcontinental line, the Los Angeles-Salt Lake, and the Louisville-Cleveland will receive 250 rotating beacons.

The Stinson Aircraft Corp. of Detroit has completed the monoplane ordered by Bert R. J. Hassell for a flight from Rockford, Ill., to Stockholm, Sweden, this summer. Hassell plans to fly by way of Greenland, Iceland, and the Faroe Islands, thus bringing the greatest over-water hop to but 528 mi. in length.

John Henry Mears and Charles Collyer, pilot, will leave New York City on June 9 to attempt to circle the world in 23 days. He will use a Fairchild cabin monoplane to cover the route from France to Japan and across the American continent. The Atlantic and Pacific will be crossed by liner. Mears set a globe girdling record of 35 days 21 hr. 35 min. in 1913 which he held until 1926.

Further repairs on the dirigible "Italia", in which General Umberto Nobile is to explore the Arctic, are being made by the crew at Spitzbergen as AVIATION goes to press. Part of the envelope, torn at Vadsoe, Norway, in landing, is being gone over, and one of the engines is being overhauled. The General plans to leave Spitzbergen for the Polar regions in a few days.



MORE AND MORE PILOTS INSIST ON SEESALL

MEN of long flying experience know that good vision is essential to safety. Since the perfection of *Seesall*, the goggle without a blind spot, there can be no excuse for faulty vision. Your vision is perfect in all directions.

Pilots are demanding *Seesall* not only for safety but also for the hour after hour comfort it assures. Wear this goggle two or three minutes and you forget you have it on. The single ply pneumatic rubber mask hugs the face without discomforting pressure—and yet there is not the slightest air leak anywhere.

Although created by the foremost makers of non-shatterable glass, *Seesall* is made of plain curved glass. If desired, you can wear *Seesall* over your own spectacles.

There are *Seesall* dealers most everywhere. But if you cannot find one, mail us your check for $15.00, and you will get your *Seesall* prepaid by return mail in a handsome metal case. With light tinted lenses, if desired, at the same price.

NAVIGATOR $8.50 PER PAIR
Companion to the Celebrated Seesall with Non-Shatterable lenses

Lamoglas
EYES FOR THE SKIES

The Two Most Popular Non-Shatterable Goggles

WRITE FOR COMPLETE CATALOG

LAMOGLAS 44. $6.50 PER PAIR
Sponge rubber binding

BECK DISTRIBUTING CORP. BECK 70 EAST 131st ST., NEW YORK
Sole Selling Agents

Wholesale orders west of the Rockies filled from stock by: R. Mohr & Sons, Mohr Building, San Francisco, Cal.

THANK YOU *for mentioning* AVIATION

Philippe Paret of France Named National Airway Terminals Advisory Board Member

ONE OF the first military aviators in France, Philippe Paret, who was also one of the managers of the famous Le Bourget Field, Paris, and an expert on airport design, construction, and management, has just been placed on the advisory board of the National Airway Terminals, which is building airports throughout the country.

Mr. Paret won his license as a pilot in 1912. At that time there were but a handful of aviators in the whole of France. Participating in many of the important air engagements in Champagne and Alsace during the World War, Paret received the Legion of Honor and the Croix de Guerre citations. At the close of the war, he was appointed one of the managers of Le Bourget Field, which is known as one of the best examples of airport design and construction. Many of the technical and administrative improvements at Le Bourget were made by Mr. Paret, who also acted as consultant in the establishment of airlines in France.

On the Advisory Board with the French expert are several prominent pilots, including Clarence Chamberlin, Clay Ferguson, Art Goebel, Bernt Balchen, C. S. "Casey" Jones, and M. M. Merrill.

According to Clay Ferguson, general manager of the National Airway Terminals, Inc., the company has received inquiries on airport developments from cities in every state in the Union and the association of this French airport official with the company will be of great aid in the selection of airport sites in this country and their development and management.

The National Airway Terminals recently joined with the William E. Arthur & Co. and the Airport Construction Co. in a combine to design, construct, and manage a chain of air ports throughout the country. They have already erected airports at Portland, Me.; Bridgeport, Conn.; Albany and Schenectady, N. Y.; and designs for many others are being worked out by engineers of the company.

First Annual Mills Field, San Francisco, Report Shows Great Growth of Activity

EVIDENCE OF the giant strides made by the air transportation industry in the past year is revealed in the first annual business report of Mills Field, San Francisco's municipal airport, just released here. It covers the 12 months of operation since the airport opened in May 1927.

A total of 8,077 flights and landings, with 12,350 passengers, in planes of every type that arrived from and left for all parts of the world, is shown in the official compilation of the city's airport committee, composed of Supervisors Milo F. Kent, Andrew J. Gallagher, and Frank J. McGovern.

There were 1940 flights and landings during April, with 3272 passengers, the biggest month of the year. During the five days of the Western Aircraft Show at Mills Field, from April 11 to 15, there were 796 flights and landings, with 1489 passengers. Even deducting those five days the April business showed a great gain over March.

Mills Field is now taxed to capacity with business despite the fact that expansion of equipment has continued regularly since the airport was established.

Official tabulation of Mills Field business by months for the year follows:

	Flights & Landings	Passengers
May	13	15
June	19	17
July	57	85
August	374	601
September	371	673
October	638	1091
November	503	756
December	920	1322
January	918	1162
February	1156	1704
March	1168	1652
April	1940	3272
Total	8077	12,350

J. C. Ten Eyck, Jr., is Appointed Sales Manager of Standard Steel Propeller Co.

ANNOUNCEMENT IS made of the appointment of J. C. Ten Eyck, Jr., as sales manager of the Standard Steel Propeller Co., Homestead, Penna., manufacturer of aeronautical propellers.

Ten Eyck was graduated from the U. S. Naval Academy, Class of '19, and served as chief engineer on the *U. S. S. Bainbridge* and *U. S. S. McDougal.* Since his retirement from the Navy he has filled the following positions: engineer of Diesel engine plant for the Phelps Dodge Copper Corp.; sales engineer of Manning, Maxwell, and Moore; sales engineer of the Combustion Engineering Corp., then manager of this company's Pittsburgh District office, and later identified with its New York sales organization.

J. C. Ten Eyck, Jr.

Standard Steel Propellers are now installed on many U. S. Army and Navy planes, and have been used in most of the famous American planes that have made aviation history during the past few years. A few notable flights made with Standard Steel Propellers are:

Col. Charles A. Lindbergh—San Diego to New York to Paris, Tour of United States and Pan-American Flight.

Alaska Survey—Mapping of Alaska, 1926-1927.

Art Goebel—San Francisco to Hawaii, Winner of Dole Flight.

U. S. Army Good Will Flight—Five Amphibian Planes, visiting 18 countries in Central and South America—30,000 mi.

Stinson-Haldeman—World's Endurance Record, 53 hr. 15 min.

Lieut. C. C. Champion—Altitude Record—38,474 ft., July 1927.

Lieut. A. J. Williams—Unofficial Speed Record—334 m.p.h.

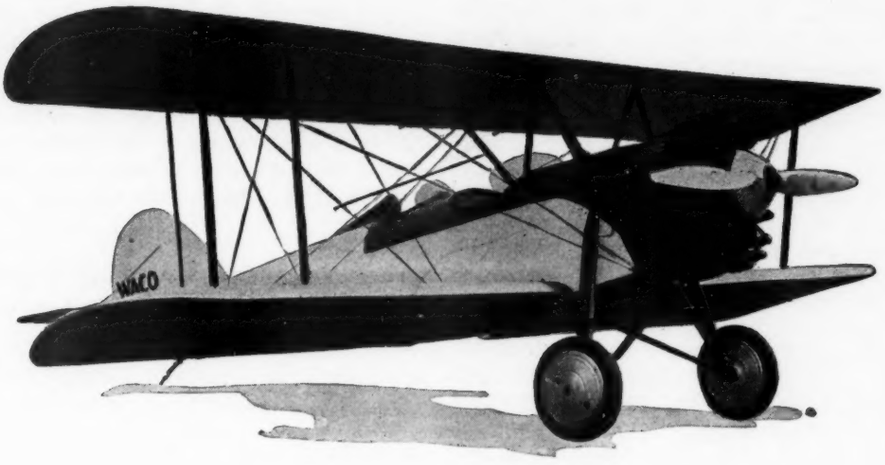
Tri-Engine Fokker Planes—Anacostia, D. C., to Nicaragua.

Ruth Elder-George Haldeman—Trans-Atlantic Flight.

Commander Byrd's Plane—For South Pole Expedition.

Queen of Yukon—Service between Dawson and Yukon.

Capt. Hood & Lieut. Moncrieff—Non-stop flight from Australia to New Zealand, January 1928.



WACO TEN — WHIRLWIND

The exceptional ability to get in and out of very small fields is another reason for the profits made by WACO operators

WACO is now available with OX5, 90 H.P. Ryan-Siemens, 125 H.P. and Wright Whirlwind 200 H.P. motors.

Type Certificates 11 - 13 - 26

California: Los Angeles—Amn Aircraft Corp. *Connecticut*: Hartford—New England Aircraft Corp. *Canada*: London, Ont.—London Air Transport Ltd. *Florida*: Orlando—Nilson—Muller Co. *Georgia*: Atlanta—Douglas Davis Flying Service. *Illinois*: Monmouth—Midwest Airways. *Indiana*: Kokomo—Clyde Shockley. *Kentucky*: Louisville—Cardinal Flyers Inc. *Louisiana*: Tallulah—Southern Dusting Co. *Michigan*: Ypsilanti—Knapp Flying Service. *Missouri*: Kansas City—Tex LaGrone. *Montana*: Great Falls—Vance Flying Service, Dillon—Montana Air Service. *New York*: New York City—N. Y. Aircraft Dist., Inc.; Buffalo—Buffalo Aircraft Dist., Inc. *Oregon*: Portland—Rankin Flying Service. *Ohio*: Cincinnati—Embry-Riddle Co., Akron—Akron Airport Inc., Youngstown—Bernard Airways Inc., Steubenville—Tri-State Flying Service. *Pennsylvania*: Philadelphia—Ludington Exhibition Co., McKeesport—Clifford Ball. *South Carolina*: Fort Mill—Elliott Springs—John Crowell. *Tennessee*: Memphis—Midsouth Airways. *Texas*: Austin—University Aerial Service. *Wisconsin*: Wausau—Northern Airways, Inc. *West Virginia*: Wheeling—W. Va. Waco Sales. *District of Columbia*: Washington—Capitol Airways, Inc. *Cuba*: Havana—Alfredo Hornedo.

WACO AIRPLANES

The Advance Aircraft Co. TROY OHIO

Lieuts. Gavin and Soucek Fly Navy PN-12 Seaplane to New 36 Hr. Endurance Mark

BETTERED BY 7 hr. 25 min. 46 sec., the world's flight duration record for seaplanes was broken on May 5 when a new record of 36 hr. 1 min. 14 sec. was established by Lieut. Arthur Gavin and Lieut. Zeus Soucek flying a Navy PN-12 seaplane powered with two Wright Cyclone engines, each developing 525 hp. The old record, which was 28 hr. 35 min. 27 sec., was set by Lieuts. C. H. Schildhauer and J. R. Kyle in a PN-9 plane May 1-2, 1925.

Lieutenants Gavin and Soucek took off Thursday afternoon, May 3, at 2:50:16 from the Philadelphia Navy Yard. J. C. Proley, mechanic, and H. F. Dayton, Wright engine expert, accompanied the fliers, thus bringing the record breaking crew to four. At 7:25:54 P.M. Friday the old mark was passed, and at 2:51:30 A.M. Saturday the fliers landed at the Yard, fuel gone and new record set. The flight was under the supervision of R. D. Weyerbacker of the Navy Aircraft factory.

Preparations for the flight were begun early Thursday morning, but heavy weather delayed the take off until 9 A.M. A second take off was necessary, however, for after 30 min. of the first flight Gavin and Soucek were forced to land on account of oil trouble. Once in the air following repairs, the plane flew up and down the Delaware River at an average altitude of 300 ft. until late Friday night. At this time, the fliers went to a higher altitude to land later in a glide when their gasoline was gone.

Official recognition was given the record by Carl F. Schory of the National Aeronautic Association who arrived Friday evening to be on hand to certify the new mark. The international code for such record attempts stipulates that when a flight is more than 48 hr. in length the old mark must be surpassed by at least one hour. When the flight is from 24 to 48 hr., the flier must exceed the old mark by but one-half hour.

Lieutenant Gavin won the Schiff Trophy last year when he flew a total of 847 hr. without mishap. The award is given for carefulness and safety in flying. Lieutenant Soucek is aviation superintendent of the aeronautical section of the Philadelphia Navy Yard.

Form Omaha-Winnipeg Airway Association To Promote Route Between Those Cities

OMAHA-WINNIPEG Airway Association for promotion of an air route between the two mid-continental cities was formed recently in Omaha by representatives from commercial clubs in Grand Forks, N. D., Watertown, S. D., Sioux Falls, S. D., Sioux City, Ia., and Omaha. More than 30 delegates, representing aviation committees and including city officials, attended a conference held at the Fontenelle Hotel.

B. B. Lawshe, secretary of Sioux Falls Chamber of Commerce, was elected president of the association, and W. M. Shirley, secretary of Watertown Chamber of Commerce, was chosen secretary.

At the close of a three hour session, at which it was decided to carry to Washington an agitation for a route between Omaha and Winnipeg, Gould Dietz, Nebraska governor for the National Aeronautic Association, who left later for Washington, was instructed to interview congressmen and federal postal authorities to urge establishment of the proposed route.

The projected route would include 600 mi. of territory between Omaha and Winnipeg, and would connect Grand Forks, N. D., Fargo, Watertown, S. D., Sioux Falls, Sioux City, Ia., and Omaha with the Canadian city.

Mr. Lawshe and Mr. Shirley, elected heads of the new organization, during the two weeks before the conference made a canvass of the territory which would be served by the proposed route, and at the meeting of aviation proponents reported universal interest and demand for the service which would result from establishment of the route. The north-central cities, they reported, furnish excellent air facilities in good emergency landings, and flying conditions over the territory, they said, are consistently good.

Lack of railway facilities from Winnipeg to Omaha was cited as one indication that the route, if established, would become a profitable undertaking. Bids from air transport companies, according to W. A. Ellis, secretary of Omaha Chamber of Commerce, would possibly equal half the amount now paid to operators of most mail routes, on account of increased profit from passenger service.

Arrow Aircraft Corp. of Havelock, Neb., Completes New Model Arrow Sport Plane

THE ARROW Aircraft Corp., Havelock, Neb., recently announced the completion of its latest model, the Arrow Sport plane, a two place, open cockpit, full cantilever biplane. The plane is a direct development from the old sport design brought out by the company in 1926. This new plane is powered with either a 60 hp. LeBlond or Anzani engine. The first to be completed was powered with a LeBlond engine and is claimed to have a top speed of 115 m.p.h. and a landing speed of 32 m.p.h. It weighs 524 lb. empty and has a useful load of 450 lb. bringing the total weight up to 974 lb. This includes two people sitting side by side in the open cockpit. The plane has exceptionally clean lines with no external bracing to support the tapered wings. However, N type interplane struts are optional with the purchaser. The plane is stated to sell for $2250 at the factory.

Front quarter view of the Arrow Sport plane.

Recently Organized Sabine Airways, Inc., Of Beaumont, Tex., is Waco Plane Dealer

SABINE AIRWAYS, Inc., of Beaumont, Tex., a newly organized air transportation company, has been designated as Waco dealer for Southeast Texas by the University Air Service, state dealer. Delivery of the first plane has been made and the second, which is expected to be a Ryan-Siemens job, will probably be received within a short time.

The Sabine Airways, Inc., will maintain headquarters in Beaumont, Tex., but will have operation units at Orange and Port Arthur in addition, according to Lieut. William K. Ennis, who has been named manager of the company. Ennis was formerly connected with the National Guard Squadron in Houston and is a graduate of Brooks and Kelly Fields.

The company will occupy a hangar recently built at the Beaumont field by the Orange Car & Steel Company and will operate a school in connection with its air transportation work. A complete flying service will be maintained.

Alexander — moves his Industries in twenty-four hours

On Friday, April 20, a fire destroyed the doping and wing covering building at the Alexander Industries, Denver. Eleven lives were lost and a number of men, through acts of heroism, received severe burns.

All doping and wing covering equipment, one hundred finished and partially finished wings, were consumed by the flames. The storage yard was filled with new Eaglerocks awaiting wings. One hundred and forty seven orders were yet to be filled. The Denver plant was badly crippled, and the huge new plant being constructed at Colorado Springs was only partially complete.

Certain public officials were bringing pressure to bear which was intolerable. On Monday night, April 23, Alexander officials were informed that the entire plant must be closed until an inspection could be made. Such a procedure would have been ruinous. Thousands of advertising film contracts had to be filled on schedule or a three million dollar annual business forfeited. Over three hundred employees faced unemployment.

D. M. Alexander, vice president of the Industries, commenced gathering his key men at midnight. Modern Paul Reveres roused sleepy yet willing workers from their beds. Over telephones incessant calls completed the job. By daylight brawn and brain were united and the tremendous task of moving a giant industrial plant was under way.

Moving companies released all available vans and the grounds of the Alexander Industries with the rising sun had taken on the semblance of a troop movement in war times.

Van after van received through their yawning maws office furniture, files and safes. Machinery, stage sets, cameras and the miscellaneous assortment of equipment which represented the tools of one of the greatest industrial plants in the West. The grand trek had begun.

Colorado Springs was seventy five miles away. Buildings for housing the Industries had already been arranged, the Business men and the Chamber of Commerce of that City had met the emergency.

An abandoned church, ideally layed out for offices, was thrown open in time to receive the vanguard. A stable became the film quarters. A warehouse was turned into a complete wood shop. A garage became a printing plant.

IN 24 HOURS "BUSINESS AS USUAL" became the sign read by the people of Colorado Springs. The gigantic undertaking which seemed all but impossible had been crowned with success.

The company is now located in one of the most friendly cities in the world. It has demonstrated itself so. The film business is again in full swing. Eaglerock deliveries will again be under way by the time this issue is in the hands of "Aviation" readers.

A crew of 165 workers are speedily completing the main Eaglerock factory building which covers a ground area equal to a city block. Doping and wing covering now being done in especially arranged tents will soon be in new buildings. Eaglerock production is recovering from a two weeks delay and will soon be on schedule.

Our friends and customers — we have endeavored to give you this story as an offset to the erroneous reports which were placed on the wires throughout the country, that we were out of business, severely crippled, plant shut down, etc. etc. We are carrying on and are immediately increasing production of the quality ship you know — EAGLEROCK.

ALEXANDER AIRCRAFT CO.

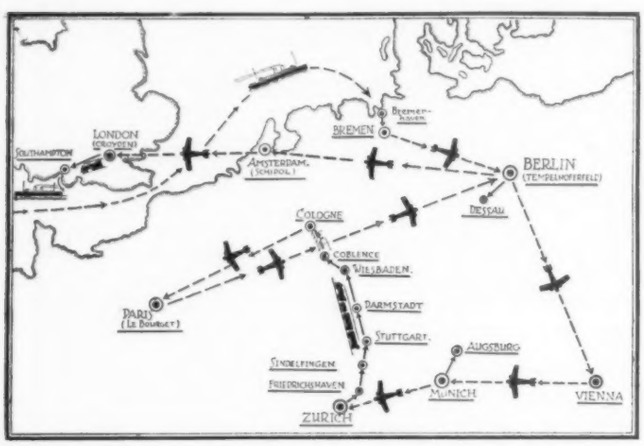
Division of the Alexander Industries, Inc. *now located in* Colorado Springs, Colorado

THANK YOU *for mentioning* AVIATION

Schedule Tourist Air Cruise of Europe To Leave Bremerhaven This September

CALLED "THE first air cruise in history," a tourist journey known as the "American Aviation Tour of Europe 1928" will cover 2,700 mi. in flights through Germany, Austria, Switzerland, France, Holland, and England early this fall. The project is under the auspices of the North German Lloyd, the German Luft Hansa, the Imperial Airways, Ltd., the Air Union, the Farman Company, and the Kon Luchtvaart My. of Amsterdam.

The Lloyd liner *Columbus* will care for trans-Atlantic passage both ways. This liner will leave New York September 8, cross the Atlantic, and dock at Bremerhaven, Germany. The air tour of Europe will follow. Special features of the trip will be announced at the International Aeronautical Ex-



Map showing the route of the American Aviation Tour of Europe

hibit to be held at that time in Berlin; inspection of the world famed airplane works of Citroen in France; Fokker in Holland; Focke-Wulf, Junker, Raab Katzenstein, Rumpler, Rohrbach, Daimler, Dornier and Zeppelin in Germany; and other points of airplane interest in England and on the continent.

For the sake of variety, and to enable the tourists to see certain sections of the journey from the ground, the comparatively short distance from Zurich to Coblenz will be made by rail. From Coblenz to Cologne there will be the further contrast of a trip on the Rhine. From Cologne to the Croydon Field, via Paris, Berlin and Amsterdam, the cruise will be continued by airplane. At Southampton the travelers will board the "Columbus" to arrive back in New York October 29.

Cruise passengers will fly in a variety of planes, it is said, during the course of the journey—German, Austrian, French, Dutch, and English—this giving them a chance to learn some of the characteristics of the various foreign aircraft.

Full information concerning the trip may be secured from the Executive Committee, American Aviation Tour of Europe 1928, 32 Broadway, New York City.

Gates-Day Company Now Building Factory For Manufacture of New Standard Planes

DEFINITE ANNOUNCEMENT of the location of a new factory of The Gates-Day Aircraft Corp. in Paterson, N. J., has been made. It is at 909-929 East 23rd St., Paterson, N. J., not far from the plant of The Wright Aeronautical Corp. This decision was made public following announcement that a group of Paterson business men, headed by Reuben H. Reiffin, president of the West Paterson Bank, had interested themselves in the organization.

New Standard planes will be produced within approximately 60 days. Charles H. Day, who designed and produced the famous J-1 Standards, said that machinery, materials, and equipment will be installed in the factory. Production will be set on a basis of 300 planes a year at the start, but will be stepped up to 500 a year within a short time, according to the officers.

The New Standard is a five place, open cockpit, sesquiplane. It will sell for $3,500, approximately, with 180 hp. Hispano-Suiza engine, and corresponding higher prices for new production water cooled engines. Mr. Day and his engineers have spent more than a year on the calculations and designs, which now are completed. Mr. Day, formerly chief engineer of The Standard Aeronautical Corp. during the war, has designed 22 successful types in his 19 yr. experience.

Officers of the corporation are Ivan R. Gates, president; Charles H. Day, vice president; George H. Daws, secretary; and Reuben Reiffin, treasurer.

Assembly will be at Teterboro Airport, Hasbrouck Heights, N. J., the operating headquarters of The Gates Flying Circus, which is a subsidiary of the manufacturing corporation. The operations company includes the flying circus on tour in the West and East, the flying school, and the various aerial passenger, photographic, and advertising services at Teterboro Airport. The repair shop at Lodi, N. J., will be continued.

Richard F. Hoyt Named Head of the Board Of Directors of the Pan-American Airways

THE ELECTION of Richard F. Hoyt to chairmanship of the Board of Directors of the Pan-American Airways, has been announced. The company is operator of the first international air line for passengers and mail between Key West and Havana.

Mr. Hoyt is extremely active in aeronautical circles. In addition to his affiliations with the Pan-American Airways, Mr. Hoyt is chairman of the Board of the Wright Aeronautical Corp., a member of the board of the Keystone Aircraft Corp., and an officer of the banking firm of Hayden Stone & Co. Mr. Hoyt has just returned from an extended tour of Central and South America during which he made a careful survey of air travel conditions in those countries.

On the board of directors with Mr. Hoyt is George Mixter of Hayden Stone & Co., C. V. Whitney, director of the Guaranty Trust Co., Sloan Colt, vice president of the Farmers Loan & Trust Co., John A. Hambleton of Hambleton & Company, R. B. BeVier, president of BeVier & Co., and J. T. Trippe, president of Pan-American Airways.

Mr. Trippe reports that since October 1927 the Pan-American Airways, Inc., has carried 170,000 lb. of mail and 700 passengers on a daily schedule which has been 100 per cent. efficient. Two full business days are saved to the traveler who uses this air service.

Waco Plane Dealership in Ocala-Gainesville District of Florida Taken by Joe Borden

JOE BORDEN, automobile dealer of Ocala, Fla., has been announced as Waco agent for the Ocala-Gainesville district of the state. He has received his demonstration plane from a carload of five received in Orlando, Fla., by Nilson-Mueller Co., state distributor, and flew it back to Ocala with his pilot-manager, L. E. McLaughlin.

Three of the five planes of the latter company have been delivered and sales of the other two have been negotiated.

FIRST ANNUAL WESTCHESTER SEAPLANE RACE MEET JULY 11th & 12th, 1928

Sanctioned by the National Aeronautical Association

Under the auspices of Playland, Westchester County Park System

Sandy, well protected beach.

Ample police grounds. Every facility for the care of seaplanes and flying boats is offered free of charge to all contestants.

PRIZES

Handsome organization trophies and pilots' prizes for military events. Cash and pilots' prizes for civilian contests.

RESERVE THESE DATES

Free Entertainment **Q. B. Headquarters**

Entries are now being received by the

Seaplane Race Committee

WESTCHESTER COUNTY PARK SYSTEM

Playland **Rye, N. Y.**

Form Metal Aircraft Co. of Cincinnati To Manufacture "Flamingo" Monoplanes

THE METAL Aircraft Co. of Cincinnati was recently incorporated at Columbus, O., and the purpose of the company has been set forth as "manufacturing, dealing in, and otherwise handling all kinds of aircraft and parts and accessories thereof." Immediate plans of the company, however, are to manufacture all-metal planes of the "Flamingo" line developed by Thomas E. Halpin and Ralph Graichen, Cincinnati, formerly of Detroit, the first of which was launched in Cincinnati Easter Sunday to be taken immediately to the All-American Aircraft Show in Detroit after being christened "Miss Cincinnati."

Incorporators of the company are T. Higby Embry, Thomas E. Halpin, Ralph R. Graichen, John C. Hermann, H. C. Yeiser, Jr., T. S. Goodman, Eshelby F. Lunken, Tyler Field and John B. Hollister. Those in the financing group are: Henry Yeiser, Jr., Hulbert Taft, Eshelby Lunken, Timothy S. Goodman, John J. Rowe, John M. Pattison, Frederick H. Chatfield, William Hayden Chatfield, Powel Crosley, Jr., Tyler Field, John B. Hollister, James Coombe, S. J. Dorsel, O. S. Greene, D. C. Jones, B. W. Lamson, E. H. Lunken, Leonard S. Smith, Jr., C. R. Wright and O. D. Vanderbilt, Jr.

This group, which had been discussing possible financing of the project from the start of the assembling of the first plane, on the day following its flight to Detroit got together and pledged more than enough to finance the manufacture and distribution of the line. It was said that offers also were received by Halpin and Graichen from financiers of New York, Chicago, Detroit, and St. Louis, to finance factories for production of the line in their respective cities, but the same motive prompted them to accept the Cincinnati offer.

Options on sites adjoining Lunken Field, the municipal airport of Cincinnati, have been secured. Attorneys John C. Hermann, John B. Hollister, Eshelby F. Lunken and T. S. Goodman will represent the company in all matters pertaining to its business.

The type of plane to be produced is an all-metal, single engine transport monoplane, within the same weight range and price range of similar wooden planes. It will hold six passengers in addition to the pilot, mail and express packages. It will also have a lavatory. Provision is made for locking the doors, and it will have all other approved safety devices. The plane will weigh 2,800 lb. and will carry 5,000 lb., including its own weight. Capacity speed will be 150 m.p.h., cruising speed 125 mi.

The plane will hold 150 gal. of gasoline and is expected to fly 1000 mi. on this amount with full load. There will be brakes on each of the two wheels of the landing gear. The Flamingo will be the largest size, single engine air transport made to date, with a 48 ft. wing span and length of 32 ft. It will be able to rise after a run of 150 ft., unloaded, or 350 ft. loaded.

The Flamingo was described in detail in the April 30 number of AVIATION.

Geared Bristol Jupiter VIII Engine Passes The Official British 100 Hr. Approval Test

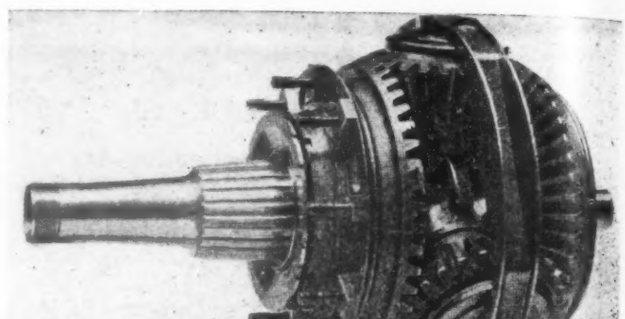
THE GEARED Bristol Jupiter engine has passed its 100 hr. official bench test of the British Air Ministry. The test was made on the series VIII engine which was officially rated at 440 hp. at 5,000 ft. The engine maintained its power throughout the tests; the full throttle brake horsepower developed at the end of the 100 hr. was within one per cent. of that developed at the start of the run. In order to cover the series IX and XI engines, which differ only in compression ratio, a supplementary run of one hour at 540 hp. at 2,200 r.p.m. was carried out on the 5.3 compression engine.

The manufacturer has submitted the following synopsis of the test:

Preliminary Power Curve 1½ hr. — carried out at full throttle from 1,600 to 2,200 engine r.p.m.

Endurance Test 100 hr. — carried out at 2,000 engine r.p.m., and at the 90 per cent. equivalent ground rating, in 10 and 15 hr. non-stop runs. The final hour engine ran at full rated power.

High Speed Test 1 hr. — carried out at 2,310 engine r.p.m., or 5 per cent. in excess of the maximum permissible r.p.m.



Farman type reduction gear used on Bristol Jupiter Series VIII, IX and XI engines.

Slow Running and Acceleration 10 min. — sustained running at 440 engine r.p.m. and accelerations up to normal r.p.m.

High Power Test 1 hr. — carried out at maximum permissible r.p.m. and at 6 per cent. in excess of rated power.

Final Power Curve 1½ hr. — carried out at full throttle from 1.600 to 2,200 engine r.p.m.

Fuel and Oil Consumptions — the average consumptions for the 100 hr. endurance test at 90 per cent. power were:

Fuel 27½ gal. per hr.

Oil 10 pt. per hr.

W. W. Dunlap Paper Tells of Successful Spot Welding Using the Aluminum Alloys

AT A recent meeting of the Detroit, Mich., section of the American Welding Society W. W. Dunlap presented a paper dealing with the results of an investigation of the subjection of spot welding of aluminum alloys by the Aluminum Co. of America at New Kensington, Pa. According to the results obtained, aluminum alloys can be spot welded successfully giving approximately the same strength as a similar rivet. The secret of the process lies in the fact that the electrodes were of copper, chromium plated. It was necessary to plate the copper with chromium as chromium does not readily alloy with aluminum while unprotected copper electrodes formed a layer of copper-aluminum alloy which produced a bad weld besides increasing the danger of burning a hole in the sheet by arcing. The tests were made with all types of aluminum alloys and it was found that when two flat sheets .05 in. by 1 in., were spot welded together at two points, the joint had an efficiency of 63 per cent. When three points were used the efficiency of the joint was 84 per cent. while when the strips were welded at four points the weld was stronger than the strips.

First Steps Taken in Cincinnati Toward City Department Control of Aeronautics

THAT AERONAUTICAL development in Cincinnati has reached the point where a decision must be made concerning the proper departments and officials to control aviation, that plans must be set afoot for the building of the city's first air passenger station, and that an aeronautical bureau to supply reliable information to pilots and passengers must be established is the conclusion of C. O. Sherrill, city manager, who has just taken the initial steps in these matters.

Following a conference between Sherrill and the City Council, it was decided to vest control of the municipal airport, Lunken Field, in the Department of Public Utilities, giving that department a measure of control over private companies using the municipal port, and full control over such non-municipal ports as may be established.

Favor Partial City Control

The director of public utilities already has been given jurisdiction over gas, electricity, taxicabs, and other utilities; and as private companies using airports will have to have schedules of routes, arrivals and departures, rates of fare, and other matters in which the public is concerned, it is felt that the city should have a voice in their control. A review of codes and ordinances by Sherrill's legal experts has revealed no obstacles in the way of vesting such authority in the Department of Public Utilities.

Sherrill further has expressed himself as favoring appointment of a director for the municipal airport, who shall be a pilot and a man with practical experience as well as scientific knowledge of air navigation and airports. Such a man, he thinks, could most intelligently serve pilots and public, and it is likely that the entire country will be canvassed for the best available.

Appearance and equipment of the passenger station, when completed, will be comparable to those of a modern railroad station, though on a smaller scale, compatible with the aviation needs of the times. An exact date for undertaking this work has not yet been set.

The aeronautical information bureau is to be established either in the City Hall or a more convenient downtown location—possibly in a kiosk on Government Square—and will furnish complete daily information to all interested persons concerning weather, routes, and fields of the United States.

Gordon Bennett Balloon Race Preliminaries Will be Held at Pittsburgh Memorial Day

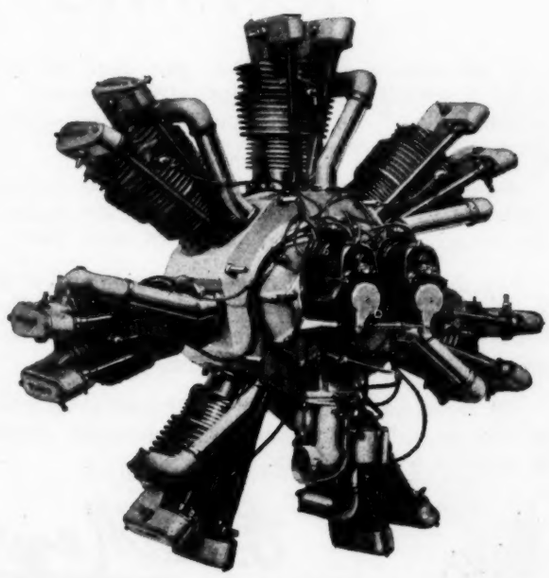
ARRANGEMENTS have now been completed by Walter Chambers, aviation editor of the *Sun-Telegraph* and prominent citizen, to hold the 1928 National Elimination Balloon Races at Bettis Field, Pittsburgh, on Decoration Day. The Aero Club of Pittsburgh is to assist in the entertainment of all the visiting pilots and other aeronautical guests that are expected to be present.

The National Aeronautical Association has announced that the winners of the first three places in the Pittsburgh elimination will be entered in the Gordon Bennett International Balloon Race which will start from Detroit June 30. Twelve balloons have already been entered in the race.

The committee is composed of the following men: Samuel G. Wharton, general manager of the Duquesne Shops, Carnegie Steel Co., chairman; W. A. Irwin, vice president American Sheet and Tin Plate Co., vice chairman; Harry C. Neel, president of the Bettis Field Corp. and director in the First National Bank of McKeesport, treasurer; and Walter Chambers, manager.

FLOCO

THE new era in aviation motor construction methods is here! ¶ Newer standards for motor performance and design have arisen within the industry to successfully cope with the modern problems of aviation. ¶ To meet these newer demands the Floco 7-Cylinder Radial Air Cooled Motor has been produced. It is the result of years of untiring effort, of the most modern and advanced engineering and it combines with these, a construction featuring the use of none but the finest quality materials obtainable. Yet, withal, Floco is modestly priced. ¶ Floco brings a new conception of power and speed combined to the end that the greatest dependability is obtained. It assumes, at once, its rightful place as the outstanding aviation motor of the new age. It meets, in ever respect, the demands of the commercial plane manufacturer for a motor of modern refinement at a low cost.



Floco A-7-R Static 7-Cylinder Radial Air-Cooled Motor. 150 H.P. Nominal at 1800 R.P.M.

Complete Information on Request

FRANK L. ODENBREIT, Inc.

138 West Seventeenth Street § Los Angeles, California

Official Recognition Given German Altitude And Payload Records Made Last January

ADVICES THAT the following World Records have been officially recognized were recently received by the National Aeronautic Association from the Federation Aeronautique Internationale.

Class C-2, Seaplanes with 8,830 lb. (4,000 kg.) payload. Altitude (Germany):
Richard Wagner, Dornier-Superwal, Four Gnome-Rhone-Jupiter 480 hp. engines, at Friedrichshafen, Germany, Jan. 23, 1928. Record—9,334 ft. Former record—none.

Class C-2, Seaplanes. Greatest payload carried to an altitude of 6,570 ft. (2,000 meters).
Germany:
Richard Wagner, Dornier-Superwal, Four Gnome-Rhone-Jupiter 480 hp. engines, at Friedrichshafen, Germany, Jan. 23, 1928. Record—8,900 lb. Former record—Lieuts. B. J. Connell and H. C. Rodd—7,726 lb.

Form Acme Airways, Inc., of Troy, N. Y., For Distribution of New Pacer Monoplane

NEWLY FORMED for the purpose of distributing the new Pacer monoplane, the Acme Airways, Inc., of Troy, N. Y., will make its headquarters at the new Troy Airport, now nearing completion. The Pacer, a semi-cantilever monoplane designed to use either the Hisso or Whirlwind power plants, is manufactured by the Pacer Aircraft Corp. of Perth Amboy, N. J.

The Acme company's territory for the plane is Northern New York and Western Pennsylvania. An order has been placed for eight, and the delivery of the first of these is expected shortly. Using the Troy Airport as a base, the company will also engage in such commercial activities as photography and aerial advertising. The Acme Airways, Inc., was formed from the old Troy Flying Service group.

The Lockheed Air Express

Continued from page 1371

Propeller	Standard Steel
Instrument board	Magnetic compass, tachometer, oil pressure gauge, oil thermometer, air speed indicator, altimeter, bank and turn indicator, eight day clock

Performance: (With pilot, 100 lb. pay load, 100 gal. of gasoline, 10 gal. of oil)

High speed, sea level	167 m.p.h.
High speed, 10,000 ft.	155 m.p.h.
Cruising speed at 1600 r.p.m.	135 m.p.h.
Landing speed	55 m.p.h.
Service ceiling	17,250 ft.
Absolute ceiling	18,500 ft.
Climb at sea level	1,460 f.p.m.
Climb at 10,000 ft.	670 f.p.m.
Time to 5,000 ft.	4 min.
Time to 10,000 ft.	10 min.
Time to 15,000 ft.	21 min.
Gasoline consumption at cruising speed	7-8 mi. per gal.
Cruising range	700-800 mi.

Patented Features Meyrowitz Luxor Goggles

In addition to all the other fine qualities that make Meyrowitz Luxor Goggles the standard of aviation, there are two patented features of supreme importance.

Asymmetrical sponge rubber cushions provide perfectly snug, comfortable fit to the face without air seepage. Can be adjusted to fit *your* face.

Ventilators in metal frames function under all conditions. Never close up with pressure. Prevent all fogging or sweating and direct air currents away from your eyes.

All models available in hand ground cylindrical or meniscus lenses or special prescription lenses at slightly higher prices.

MEYROWITZ LUXOR GOGGLE
U.S. Air Service Model No. 6

In convenient protective aluminum case, $10.75

LUXOR GOGGLES No. 5, $7.50
LUXOR REGULAR No. 6, $9.75

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Established 1875

Send for 1928 *Catalog and prices*

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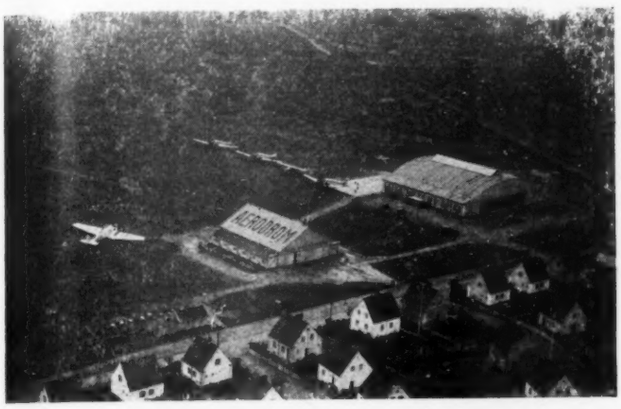
Minneapolis St. Paul Detroit London Paris

Aeronautics in Sweden

Continued from page 1369

Consistently this policy of safety has been maintained in Sweden. When the first million kilometers had been flown, A.-B. Transport was able to give out the convincing and tempting slogan—1,000,000 kilometers—28,000 passengers—100 per cent. safety. Steadily through the years the number of kilometers and passengers had increased, but the 100 per cent. safety had remained a constant factor. Such transit record is more assuring than many another vehicle of modern transportation can show.

In addition to this "Safety First" program, Sweden has carried on active propaganda to bring home the idea that the airway can become the everyday way. Last year a leisurely



Aerial view of the Bulltofta Airdrome in the south of Sweden.

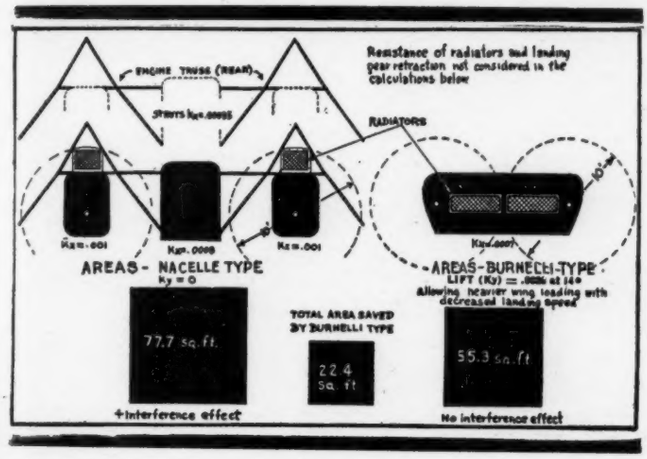
Round-Sweden Tour was undertaken. Its aim was to make the public familiar with the 100 per cent. Safety First slogan and with the actual pleasures of flying. The tour began in April and ended early in October—a period of five and one-half months. The time limit was determined partly by weather conditions. The northern tip of Sweden lies well within the arctic circle and the southern tip does not extend as far south as does Hudson Bay in Canada.

During the tour 106 Swedish towns were visited and the route extended from charming medieval Ystad on the arm of the Baltic to Kiruna within sight of the rugged snow-capped fjelds of arctic Sweden. Some two thousand photographs were taken from the air. There were 2,122 take offs, and 8,428 persons seized the opportunity for a flight, long or short. The actual distance covered was not great—a little more than the distance around the globe at the equator. There was no attempt at making or breaking records—merely an endeavor to make the six million Swedish people learn to think of the airway as the everyday way. One out of approximately every seven hundred of the total population flew. The total flying time was 357.7 hr.

While this Round-Sweden tour was in progress, Colonel Lindbergh was making his flight through our forty-eight states on schedule time. The *Spirit of St. Louis* covered 22,350 mi. There were stops at 82 cities. The tour began on July 23 and ended on October 23, with a total of 260 flying hours.

A comparative study of these figures only stresses the seriousness with which Sweden has launched its aeronautics propaganda. It should be borne in mind that Sweden has an area that is only a little larger than the total area of California and a population that is about the same as the population of New York City. One may safely predict that the intensive work of the Round-Sweden tour will tell in the

DESIGN



INVENTION of original airplane design has been rare and especially so when proved by thorough engineering construction and operation.

The Burnelli design combines the advantages of the single engined tractor with those of the nacelle type airplane with greater efficiency and accommodation.

Some Advantages of the

BURNELLI TYPE

Accessible multiple engine compartment
Extensive reduction of head resistance
Reduced turning moment on one engine
Fuselage lift reduces landing speed
Increased capacity of the fuselage
Structural efficiency and simplicity
Practical Landing Gear Retraction

REMINGTON ARMS BURNELLI

247 PARK AVENUE, NEW YORK CITY

tables and figures of regular passenger flying when the season for 1928 draws to a close.

The hydroplane used for this tour was a Junkers, type F13, provided with a Junkers LII engine. It is an interesting commentary on the topography of Sweden that the pilot was able to effect a landing within range of nearly every town of the country. One-eighth of the total area of Sweden is water, and the large towns are concentrated around the waterfront of lake or river or inlet of sea. In fact, only ten towns in all were passed by because of inadequate landing facilities

Transferring an injured man from a Swedish air ambulance to a ground ambulance.

for a hydroplane. In addition, four other towns were omitted from the schedule—Karlskrona, Vaxholm, Haparanda and Boden—since they lie in areas prohibited to civilian flying.

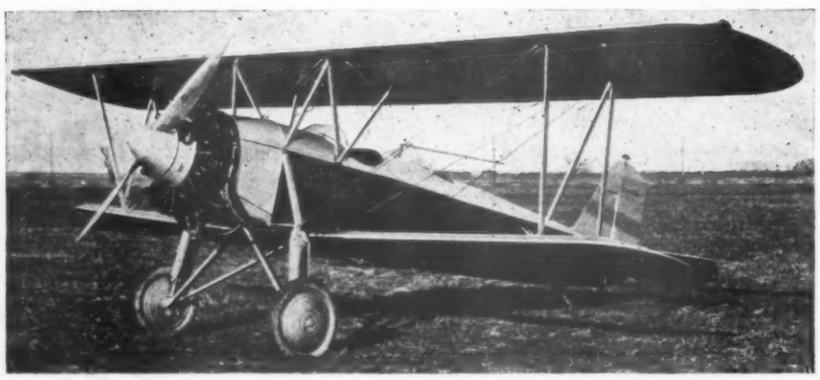
At Boden, one of these four towns, is concentrated another type of air service. This is the station for the air ambulance work of the Swedish Red Cross. Some years ago Prince Carl, brother of King Gustav V and one of the many members of the Swedish Royal family that are actively engaged in the work of the world, laid the foundation for this service of providing the ambulance plane for relief work in times of peace in the wilderness of the north. The ambulance plane,

One of Sweden's Red Cross planes equipped to land on the snow.

carrying the sick to the military hospital in Boden, has more than once saved the life of someone living in the outposts of civilization. Similar services have also been extended by ambulance planes operating from Ostersund, to the south, and for those who live on the most remote islands of the Stockholm skerries.

Recently a public-spirited citizen of Sweden made a donation of 50,000 *kronor* to further the Red Cross work in this far north. Other gifts have also been received. Bids have been placed for the construction of a new ambulance plane, modern in every detail, to supplant the Breguet army plane with which all the pioneer work around Boden was accomp-

The STEARMAN-*Whirlwind*



STEARMAN AIRCRAFT are not built with the intent of competing in that already large field of manufacturers wherein sales are dependent on the low selling price of a product.

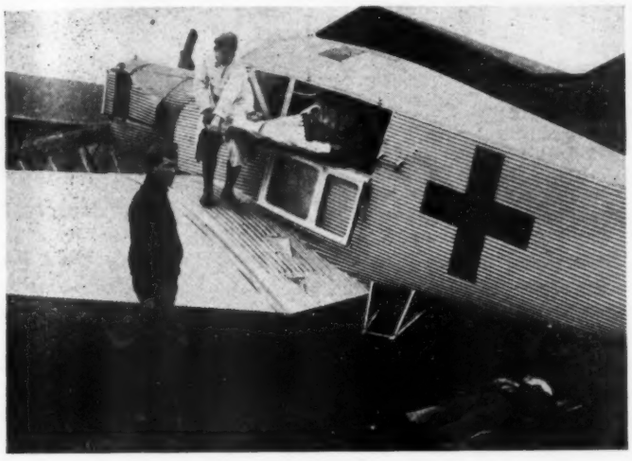
STEARMAN AIRCRAFT HAVE A PERSONALITY

The Stearman Aircraft Co., Wichita, Kansas

lished. The latter will be retained, however, for a much-needed supplementary service.

The pilot encounters many special problems in the northern regions. For winter flights the plane is equipped with skiis. Daylight in midwinter lasts only two or three hours at the most. When a call comes in to Boden, or Ostersund, it may require a flight of from four to five hours or more over bleak snow-fields.

In the summer quite different problems arise. A plane provided with facilities for landing either on water or on land would solve many difficulties. The usual landing is on the wide expanse of one of the Norrland rivers. However, at times they are filled with huge rafts of timber floating down to sulphite factory or saw mill, for Norrland is the great forest region of Sweden. Farther north, where the mid-night sun shines uninterruptedly day and night for weeks, the pilot



Placing an injured man aboard a Swedish Red Cross Junkers air ambulance.

must occasionally perforce fly due north, only to be blinded by the blazing brilliance of the sun hovering for hours just above the horizon's edge.

Often this Red Cross work, maintained principally for outposts of civilization, makes an appeal to someone who has resisted all other propaganda and dismissed the regular passenger flying as precarious or at best an unnecessary luxury. In fact, the ambulance plane has even conquered the timid heart of the nomad Lapp following his reindoor over the snowy tundras. At first the Lapps ran in terror from the "flying witch". Now, once they have been brought by plane to the hospital in Boden, they plead to be permitted to return by the air way when they are well again.

Slowly, through a safe and sane passenger service and through this Red Cross work, Sweden has been absorbing the gospel of good will for the sky. The country has an unusually extensive system of waterways, and its railway system is more comprehensive, in proportion to population, than that of any other European country. Despite all this, civil aviation supplements other means of transportation. Even before the first season was ended, it was clear that the project had passed from the experimental stage to a permanent basis directed toward a slow but consistent development.

The Langley Field Maneuvers

Continued from page 1368

The bombers, with their crew of four men and their machine guns fore and aft, can concentrate an extremely heavy fire on any attacking plane. The theory is, that so long as the bombers can concentrate this vastly superior weight of fire, they are comparatively safe. The pursuit planes attacked several times, but always they climbed above the bombers to

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AIRLINE OPERATORS will find this plane meets with all their requirements. The cabin has exceptionally comfortable seats for four large passengers and the pilot's visibility is unexcelled.

PRIVATE OWNERS will approve of the fine appointments which are selected to satisfy the most critical taste.

CORPORATIONS desiring to keep step with the progress of the times will find that here is an efficient and up-to-date vehicle for transporting executives and personnel to widely separated branches.

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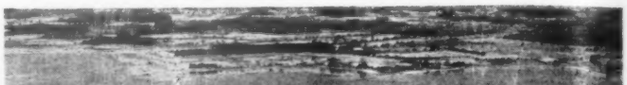
Marysville Michigan

get a diving start, and the attacks were all made from behind or side. The pursuit planes travel in flights of three, with the center plane in the lead and giving the signals for maneuvers. In the first attack, successive groups of three planes dove down on the bombers one after another. The next attack came from above, but the groups started in a widely spaced formation which concentrated as they neared the bombers. In other attacks, some of the planes dove straight in, while others dove behind and then zoomed up underneath. From the ground it was very hard to judge how close the planes really were, but at times it looked as if the two formations nearly passed through each other.

Smoke Screen Laid Down

After this sham battle, the bombers, and later the pursuit planes, landed while still in formation. A smoke screen was then laid down by three planes, and, there being little wind, it blocked off a mile or so of landscape as the silvery curtain drifted slowly across the field. Three planes did acrobatics for the benefit of the crowd that had come in from Old Point Comfort and from Norfolk, and the morning closed with the burning of an observation balloon which was attacked by pursuit planes using incendiary bullets.

In the afternoon, artillery officers, infantry officers, Congressmen, reporters and movie men climbed laboriously to the roof of the dirigible hangar and there sat in a broiling sun while the bombers took off and went up to an altitude of 5,000 ft. The results, though, were well worth the wait. The target consisted of white upright markers simulating a column of infantry on the march. It was about half a mile long and perhaps fifty yards wide at the widest point. The first attack was made by the attack planes which made a hedge hopping approach at high speed. However, before reaching the targets, they climbed to some 350 ft. in order not to be hit by fragments of their own bombs. The first flight of three planes came down with their machine guns spitting viciously, while little spurts of dust spread down the line of targets. The second group of three planes dropped



Aerial view of the hangars and planes at Langley Field, Va.

25 lb. bombs along the whole half mile of targets. Another group came in with machine guns and a fourth with bombs. By the time the attack group had passed, one fervently hoped that one would not be in the infantry during the next war. As each attack plane carries six machine guns, the volume of fire which they can deliver is considerable. A bomb is being developed for them with a delayed fuse so that they can fly

Keystone—
a consistent user of
HASKELITE

KEYSTONE Aircraft Company has used HASKELITE, the structural plywood, for a long time. They are today large consumers of this material. They say "plywood made with blood glue is superior to any casein plywood we have used. Blood albumen plywood is found especially good when subject to heat and moisture."

Naturally they stick to HASKELITE — the blood albumen glue plywood that meets every requirement of aircraft construction.

Scores of builders have standardized on HASKELITE. Over 95% of the plywood used in the industry is of this company's manufacture. Ask for our blue print booklet.

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Toronto, Montreal, Winnipeg, New Glasgow

A-5-Gray

very close to the ground without danger of being hit by fragments. This will enable the attack planes to skim the ground and trees, and on account of their speed and the surprise of their attack it will take great skill and courage for the infantry to shoot them down.

After the attack had passed, the majestic drone of the bombers was heard far overhead. They were flying across the target and all eyes were strained watching for them to loosen their load. When they did, the result was tremendous. The bombs were well bunched; in fact, the individual explosions could hardly be made out, but the column of smoke, the geysers of flame, and the violence of the concussions indicated that the neighborhood must be most unhealthy. In fact, even the hangar, which was half a mile away, was not too pleasant. The first explosion made it rock and each succeeding shock increased the motion, so that every one was glad when the thing stopped.

To the non-military man, the demonstration at Langley Field brought out the fact that military planes are now highly specialized and each has a definite function. Even those who are thoroughly sold on the offensive power of aircraft were greatly impressed by the demonstration of the progress which has been made in recent years. An independent spectator could hardly fail to be convinced of the great effectiveness of aircraft as a weapon of offense.

A story on the Langley maneuvers cannot be closed without a word of thanks for the kindness shown to visitors by the personnel of the field. Every one put himself out to be friendly and to explain what was going on.

The New Curtiss Chieftain

Continued from page 1365

length which automatically gives a very high weight per horse power as compared with the other types of engines. This overall length is necessary on account of the large cylinder centers necessary to get cooling on each cylinder barrel and on the cylinder head. The air cooled Vee engine is eight or ten inches longer than a water cooled engine of the same bore, however, the engine has a very great advantage of being able to run at high engine speeds on account of the overhead valve gear and the light reciprocating parts on the crankshaft. The exhaust arrangement is very satisfactory, particularly when the engine is built in the inverted form.

The cooling air to the cylinders can be controlled by means of shutters, if necessary, and the air to the crankcase can also be controlled by shutters.

One of the biggest problems with this engine, however, is proper intake manifolding.

Considering all of these types of engines the rotary inductor and supercharger have been included in the design, therefore, when connecting the supercharger in the Vee engine to the cylinders, the straight or gallery type manifolds have usually been employed which are extremely unsatisfactory at high altitude, owing to the fact that the gas distribution with this type of manifold is very poor. The engine runs very well at sea level where the manifolds are not subjected to the cold air blast and where the heat of the mixture is higher owing to the higher initial temperature of the charge. In order to apply a satisfactory manifold to this engine weight and frontal area are increased, inasmuch as the manifold arrangement must be on the outside of the cylinder banks.

Twelve Cylinder Hexagon Type

After making the above study it was decided to attempt a combination of the radial and Vee engine which would satisfactorily combine the good features and do away with the objectionable features of both. The type of engine selected is that which we have coined the name "Hexagon". In other

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Keystone Aircraft *Corporation*

BRISTOL, PENNSYLVANIA

words, the Vee engine was cut into three sections, these sections of four cylinder Vee engines being placed in radial form 120 deg. apart, resulting in a two row radial 12 cylinder engine, one row directly behind the other. By blanking off the rear end of the exhaust Vee in each of the three Vees, Vee engine cooling was obtained.

The feature of the low weight per horse power of the radial was partially maintained, as there is no question that the single row radial is the lightest form of engine at a given r.p.m., and displacement that is known today. However, by increasing the engine crankshaft speed this difference was offset. Second, the head resistance was kept very low, the engine outside diameter being 45 in., and the cowling diameter 39 in., which results in high propeller efficiency as the ratio of the diameter of the propeller to the diameter of the engine becomes larger than on the big radial engines, leaving the propeller tips in clear unobstructed air in a symmetrical form around the engine. In fact, the propeller has less flutter when operating in front of a symmetrical body than it would behind a form of engine such as the inverted Vee, particularly if the propeller runs very close to the engine. On account of the small diameter and a short engine very high visibility was obtained. With six cylinders in a radial row there are large spaces, 60 deg. between each cylinder bank, which permits visibility as obtained on a 39 in. diameter since the 45 in. diameter prevails only at the overhead valve gear covers which extend for only a very short part of the circumference and are streamlined easily.

With only six cylinders on a crankpin the weight of reciprocating parts was greatly reduced permitting higher crankshaft speeds. Overhead valve gear similar in design to the D-12 valve gear was used which again permitted the higher crankshaft speeds. The exhaust arrangement is exactly the same as on any Vee engine with the addition of an extra row of exhaust ports at the bottom of the engine which can be manifolded with a muffler in a single row at the two sides and bottom adding practically no head resistance and not interfering with visibility.

The cooling air to the cylinders can be controlled as on the Vee engine. Reduction gears of either the concentric type or the spur type can be used, the latter possibility being a very great advantage on the engine and one which cannot be used on any other form of engine without interfering with cylinder cooling or increasing the frontal area of the engine, as would be the case on the inverted Vee engine should the reduction gear or the spur type be raised above the crankshaft center line.

The application of the spur gears in this way on the inverted Vee engine would also entirely ruin the visibility from the pilot's cockpit. The spur reduction gears would not interfere with cowling or visibility on the Hexagon engine and they would raise the center of the propeller shaft, giving more clearance for the propeller which naturally would be larger in diameter if run at a slower speed.

The overall length of the Hexagon type of engine is only about 8" more than the single row type which is a negligible figure when the installation in an airplane is considered. There is also no question that the larger the number of cylinders on an engine of this power the smoother the operation of the engine will be.

Twelve cylinder torque has been demonstrated repeatedly to be very much more satisfactory than the torque from a smaller number of cylinders of the same size when the engine is run at the same crankshaft speed.

It is not possible to completely balance the nine cylinder radial engine or any other single row engine using the articulated type of rods. These engines do not run as smooth as the 12 cylinder, but they have been found to be satisfactory

in service. The balance of the articulated rods on the Hexagon type is perfect, inasmuch as one row of the cylinders completely balances out the other row of cylinders on the opposite crank throw and it was only necessary to put enough balance weights on the crankshaft to take care of the unbalanced couple existing.

The above outline describes roughly the arrangement of the engine, however, a few details making this combination possible are given below:

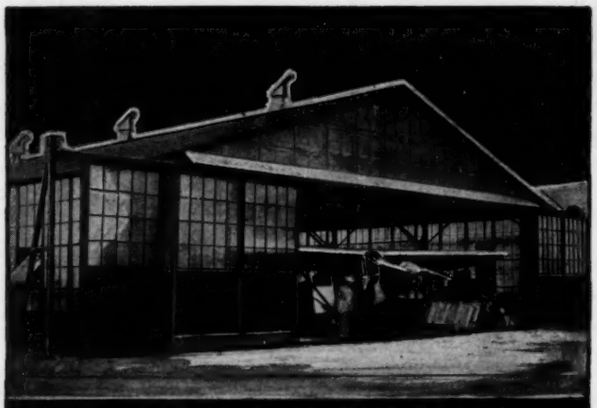
The cylinder construction is of the conventional type with the exception that a four valve flat head cylinder is used similar to the water cooled Conqueror engine. Bronze seats are inserted in the aluminum cylinder head and the steel cylinder is screwed in the aluminum head in the usual manner. Each cylinder in a bank has a large pilot on the top end which fits into a casting bridging the two cylinders. This casting is held in place with studs and nuts and carries the double camshaft bearings. The two camshafts on each bank of two cylinders are driven by spur gears at the propeller end, one of these spur gears being mounted on an idler shaft below the two camshafts. The idler shaft is driven through bevels and a master gear on the front end of the crankshaft, all of the vertical shafts being driven from this master gear. Each pair of camshafts has a serrated face coupling for timing adjustment.

Close up of a Curtiss "Falcon" showing the installation of the Curtiss "Chieftain" engine.

The crankshaft, which is a two throw, 180° crank, is mounted on two Norma-Hoffmann roller bearings one at each end. The center main steel backed babbitt lined bearing is mounted on a large split circular bearing support which is large enough to clear both crankpins enabling the shaft to be dropped into the crankcase which is of the barrel type. The crankcase is split at right angles to the crankshaft between the two rows of six cylinders being bolted together on inverted flanges on the inside of the crankcase before the cylinders are put in place. This gives a very clean exterior on the crankcase and the internal flange forms a support for the center main bearings.

The nose piece on this engine contains only the cluster of bevel gears for driving the camshaft, and the oil pressure strainer. The strainer is located at this end of the engine for the purpose of accessibility and permits the use of an oil seal for forcing oil into the crankshaft for lubrication purposes. A large deep groove ball bearing for both radial and thrust purposes is used at the forward end of the nose of the engine on the crankshaft.

The connecting rods are of the split type, very carefully



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keyed together with integral keys. Owing to the fact that the number of cylinders are even, the rods are perfectly symmetrical permitting the bolts to be placed very close to the babbitt lined bearing shells, thus eliminating the big objection which is always present in a radial engine with an odd number of cylinders in a row. The connecting rod in the single row radial engine must be unsymmetrical making it very hard to get a satisfactory bolting arrangement on the split connecting rod.

Pistons are of the hollow head type and are of the conventional ribbed design which have been used by Curtiss for many years.

Fitted With a Supercharger

The engine is fitted with a rotary inductor or supercharger which will give sea level power at 12,000 ft. It is of the General Electric Company's centrifugal type and is mounted in the rear of the engine being driven by four spur gears, two being on a jackshaft. One main shaft is carried through the defuser of the supercharger to drive all accessories which are mounted on the back of the engine. A very unusual and novel method of mounting accessories has been employed on this engine. All accessories are mounted in such a position that they are accessible when an engine is installed in an airplane.

The starter and magneto are mounted on opposite ends of a horizontal cross shaft driven from very large bevel gears from the shaft which was carried through the defuser. This same shaft through the defuser carries a larger helical gear which drives two vertical shafts in the rear gear case. Two distributors are driven from helical gears from each of these two shafts, the oil pump being driven off the lower end of one of these shafts and the gasoline pump off the lower end of the other shaft. The generator is mounted in a vertical position, on the top of the gearcase driving through bevel gears. In other words, there are only three bevel gears on the rear end of the engine, driving accessories.

The two gun control drives are taken from the top ends of the two vertical shafts previously mentioned. The tachometer drives are taken from the back ends of the camshaft housings as desired.

The carburetor intake elbow is cast integral with this gear case and a single NA-U8J Stromberg carburetor with economizer control is used.

The Standard Curtiss lubricating system is used in this engine with the addition of several features which will be pointed out:

Oil is lead from the pressure pump by a steel tube to the pressure oil strainer on the nose of the engine, passing through this strainer to the crankshaft, thence to the two connecting rod bearings and the center main plain bearing. Oil is index fed to all the articulated connecting rod bearings and the leakage from the rods lubricates the cylinder walls and piston pin bushings. Oil under pressure is index fed to all the plain bearings in the gearcase of the engine and also to the ball and roller bearings wherever it has been found necessary. Oil is conducted to the camshaft bearings through the vertical driveshafts and is returned to the main crankcase by gear oil pumps formed by a casing built around the spur gears which drive the camshafts. Therefore, by the addition of a small amount of weight these camshafts spur gears are put to work as oil pumps, keeping the cylinder head covers properly scavenged. Two main scavenging oil pumps are provided, one to take oil from the front end of the engine and the other from the rear end of the engine, returning it to the outside oil tank. Oil thermometer locations are provided.

When analyzing the description as given above it can be seen that this engine consists of conventional well tried ideas

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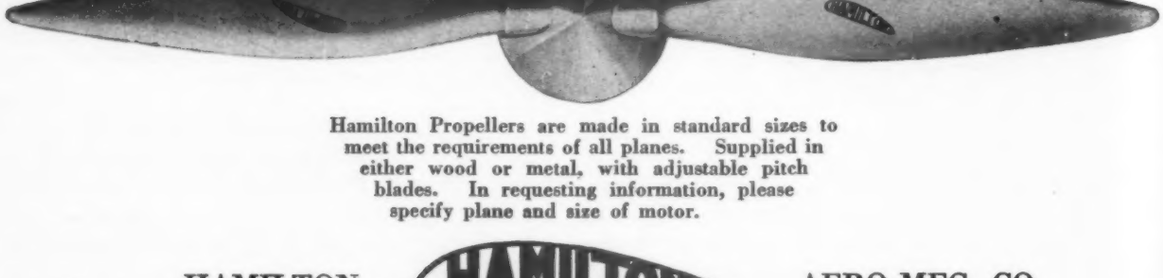

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put together in a new form. One of the first questions that comes up is the method of firing the cylinders. It is not possible to fire an even number of cylinders in radial form in a four cycle engine on a single throw crankshaft. However, when two rows of cylinders are used it is possible to jump to the back row at the proper time and then back to the front row getting even firing and satisfactory operation. It is also possible to fire all the front row and then jump to all the back row. The third possibility is to fire two cylinders in the front row, two in the back row, and then two in the front row, etc. However, of these three firing orders the first named was found to be the smoothest and most satisfactory.

The tests conducted on this engine during the past eight months have indicated that the engine is a very satisfactory type. It develops 615 b.h.p. at 2200 r.p.m. The weight, including exhaust flanges, exhaust heater, including the heater on the induction passage elbow and the throttle barrels of the carburetor (this weight is not usually included in the weight of air cooled engines as built today) is 900 lb, which gives a specific weight of 1.46 lb. per horse power which compares very favorably with any air cooled engine built today.

The frontal area per horse power of this type of engine is approximately one-half of the nine cylinder engine of the same horse power.

This engine has the same frontal area with less head resistance on account of its better aspect ratio than the conventional 200 hp. radial engine and with this decreased head resistance it has the advantage of over three times the horse power. The engine has been developd primarily for pursuit and observation types of airplanes but with future development and the adaptation of reduction gears it promises to be a satisfactory engine for slower types of planes.

Characteristics

Name	Curtiss
Hp. (rated) at 2200 r.p.m.	600
Model	H-1640
Type of engine	Static Air Cooled Hexagon
No. of cylinders	12
Arrangement of cylinders	.2 radial rows of 6, front cylinders directly in line with rear cylinders
Dia. of engine	45 in.
Dia. of cowling	39 in.
Bore	5⅝ in.
Stroke	5½ in.
Displacement	1640 cu. in.
B.H.P.	615
Ignition system	Splitdorf Magneto
Carburetor	Stromberg NA-U8J
Fuel consumption cruising at 2000 r.p.m.	.53 lb. per b.h.p. per hr.
Oil consumption	.020 lb. per b.hp. hr.
Speed of propeller	Crankshaft
Rotation of propeller	Clockwise
Weight of engine	900 lb.

The Navy PN-12 Seaplane

Continued from page 1366

Horsepower	1,050	800
Wing Area	1,217	1,397
Lb./hp.	15.2	16.6
Lb./sq. ft.	13.2	9.5

From the above table the improvements which have been made in the development of this type are very evident, and in making the comparison it should be held in mind that, as has been proven by service experience with the PN-10 and pre-

Well. Well

What have we here?

NONE OTHER than a popular impression of little Johnny learning to *Fly* by MAIL! First thing you know he'll have his correspondence school diploma — and then watch out Lindy! If Johnny doesn't hop to Mars it will be Mars' fault entirely . . .

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liminary tests of the PN-12, the latter can be operated in service at a much higher gross load than the above, which will increase the useful load accordingly. Based only on this table, however, the useful load has been increased 50 per cent. over that of the F-5-L, and is now 48 per cent. of the gross weight. This increase has been effected by a combination of lighter weight, due to metal construction and air cooled engines, increased aerodynamical efficiency, and increased engine power. At the same time there has been a considerable increase in the fixed equipment item of the weight empty, due to additional navigational, electrical and other equipment.

The peacetime crew of this plane consists of four men as follows: Pilot, navigator-bomber, radio operator, and mechanic-gunner. In wartime, however, the crew would be increased to at least five, in order to properly handle the armament provided which is as follows: Bomb racks capable of carrying 1,000 lb. of bombs of various sizes up to two 500 lb. bombs; and gun mounts for six Lewis machine guns, two in the forward cockpit, two aft and two in the side aft.

This plane is designed so that it can readily be fitted with extra fuel capacity in case it is desired to use it as a long distance scout plane, in which case most of the armament weight would have to be removed. During the preliminary trials, it has shown that the plane can readily take off with 17,000 lb. gross load. Experience with the PN-10 and consideration of load factors show that this can be done with safety. This would allow an extra load of about 450 gal. of gasoline or 1200 gal. in all, with which the endurance as a long distance scout should be about 27 hr. and the range about 2,000 mi. at cruising speeds. Trials are now being conducted to obtain accurate data as to these performances.

Editor's note: Since the writing of this article the PN-12 has established a new world's endurance record for seaplanes.

Information concerning this record flight is contained in a news article printed in the news section of this issue.

Chassis Analysis

Continued from page 1367

36 x 8	18,000	56	7.25	2.697
44 x 10	33,000	132	10.0	3.20
54 x 12	38,000	175	12.0	4.00

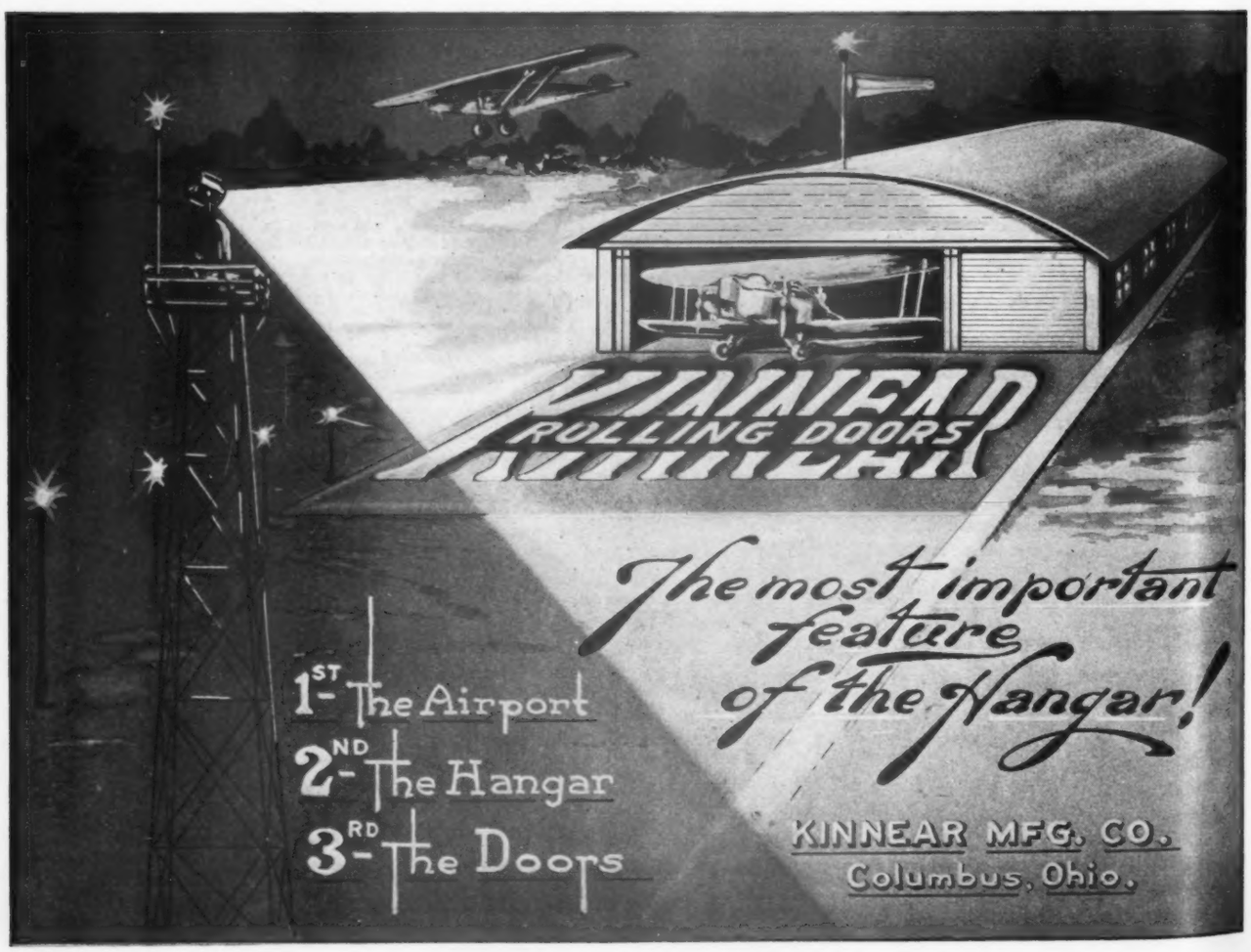
Shock Absorber Systems.

The simplest method of taking shock loads is by the elongation of elastic chord. Up to a few years ago this was about the only method employed, and it is still widely used. A load-elongation diagram for shock absorber chord is given in Fig. 67.

Many companies are now making oleo and oleo-pneumatic shock absorbers for airplane use. These are heavier than elastic chord systems but they are much better as far as shock absorbing and maintenance qualities go. The fact that the load factor may be decreased 25 per cent. with an oleo gear indicates that they absorb the shock more effectively. The use of a lower load factor will also save some weight in the struts and possibly the wheels and thus compensate for the extra weight of the absorbing system.

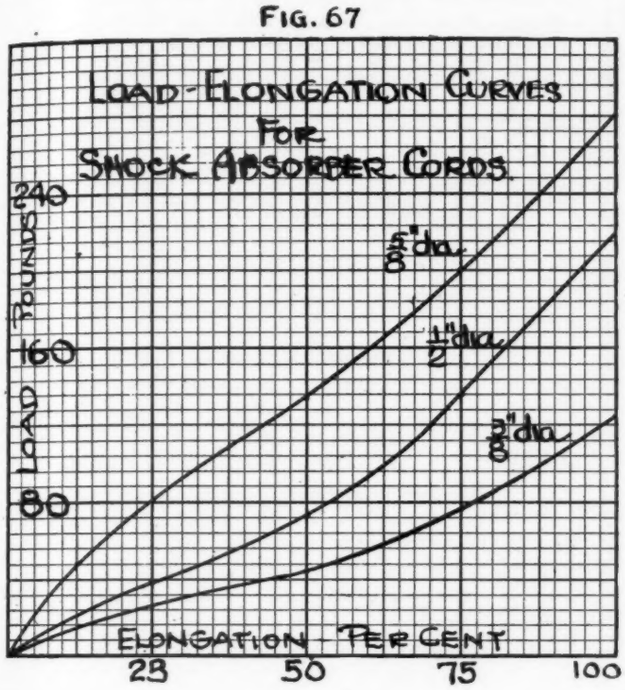
Chassis Analysis of
Conventional Semi-Cantilever Monoplane.

The gross weight of the plane, the chassis weight, and the position of the center of gravity of the plane are used in the chassis analysis. The first thing to do then is to list the



weights and figure the center of gravity of the airplane. A complete installation diagram of the plane should be made, the center of gravity of each item placed as nearly as possible, and the location of each point measured off and listed as in the following table. The propeller axis is horizontal and all measurements are made parallel or perpendicular to it.

FIG. 67



Balance Table.

Horizontal Arms measured from front face of rear propeller flange.

Vertical Arms measured from thrust line (propeller axis).

Item	Weight	Vertical Arm	Vertical Moment	Horizontal Arm	Horizontal Moment
Propeller	65	0	0	—3	—195
Engine	360	0	0	8	2880
Oil & Tank	45	—10	—450	32	1440
Power Plant Equip.	50	10	500	42	2100
Pilot	165	0	0	66	10,895
Chassis	130	—36	—4680	60	7800
Gas & Tanks	330	33	10,890	80	26,400
Wings	355	32	11,360	80	28,400
Fuselage	220	—3	—660	96	21,120
Passengers	330	—7	—2310	102	33,660
Baggage	100	—21	—2100	102	10,200
Tail Skid	10	—15	—150	288	2880
Tail Surfaces	50	12	600	317	15,850
Totals	2210		+13,000		163,430

Vertical position of C.G. = 13000/2210 = 5.88 in. above thrust line.

Horizontal position of C.G. = 163,430/2210 = 73.95 in. back of prop. flange.

Location of Wheel Axle:

Vertical Position = —45 in. below thrust line

Horizontal Position = 59 in. behind prop. flange

Distance between C.G. and Axle:

Vertical = 5.88 + 45 = 50.88 inches

Horizontal = 73.95 — 59 = 14.95 inches

Description of Chassis.

The chassis used on this plane is one which has been used extensively on commercial planes during the past two years. It is by no means the best available type but it is simple to construct and analyze. The axle and the rear strut are

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pinned horizontally at the lower longeron; the long, shock absorber strut extends to the upper longeron where it is also pinned horizontally. On landing, then, the chassis pivots outward about the lower longeron and the shock absorber strut shortens. An elastic chord absorbing system is used. The wheels are 28 x 4 inches as these are the smallest wheels strong enough to take the required loads.

Fig. 68 is a line diagram of the chassis after the shock absorber strut has compressed 4 inches. The analysis must be made with full load on the shock absorber, that is maximum

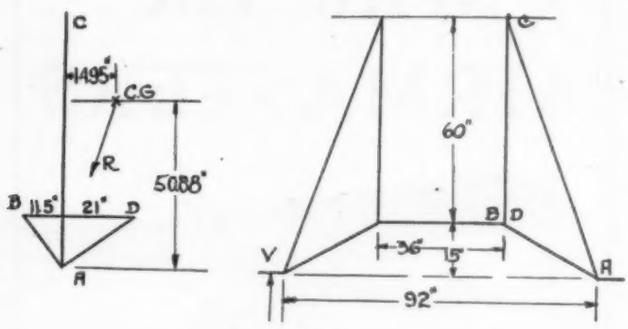


FIG 68.

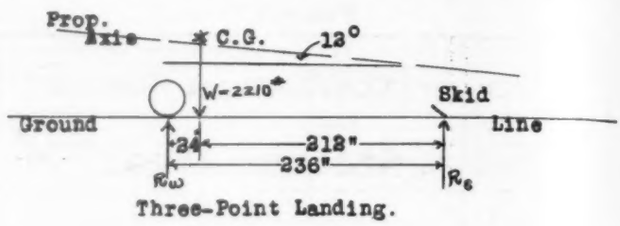
compression or tension of the shock absorber, unless a partial deflection gives more severe loads in the struts. Usually maximum deflection is the worst condition and most chassis are analyzed for that case.

Fig. 70 is a line diagram of the three-point landing condition. The chassis shock absorber strut is compressed 4 inches and the tail skid absorber is stretched 4 inches—its full amount.

True Lengths of Struts.

Member.	V	D	H	V^2	D^2	H^2	$L^2 = V^2 + D^2 + H^2$	L	
Front Strut	15	11.5	28	225	132.2	784	1141.2	32.9	AB
Absorber Strut	75	0	28	5625	0	784	6409	80	AC
Rear Strut	15	21	28	225	441	781	1450	38.1	AD

In the analytical solution of the chassis it will be necessary to use the components of the struts in the vertical, drag, and



Three-Point Landing.

Fig. 70.

side planes. They will be listed in the table below for ready reference.

Components of Struts

Member	Length	V/L	D/L	H/L	
Front Strut	32.9	.456	.350	.851	AB
Absorber Strut	80	.939	0	.350	AC
Rear Strut	38.1	.394	.551	.735	AD

Solution of Chassis for Unit Loads.

Unit vertical, drag, and horizontal side loads will be applied to the chassis structure and the loads in the struts determined. The actual loads in the struts will then be determined by multiplying the stresses due to the unit loads by the true vertical, drag and side loads.

At the point A the three struts meet. As we do not know the load in any of the struts, we have three unknown quan-

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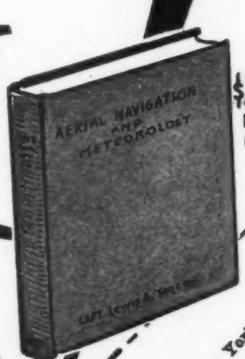

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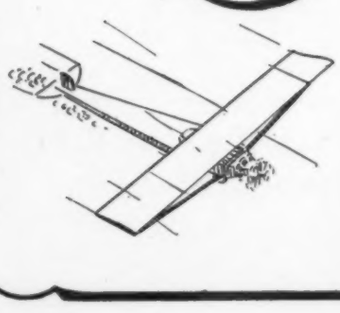

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tities. However the point A must be in equilibrium and therefore the summation of all the vertical forces must equal zero, summation of all the drag forces must equal zero, and summation of all side forces must equal zero. These three conditions allow us to form three simultaneous equations, the solution of which will give the unknown loads in the struts. In forming the equations it is assumed that the loads are acting at the apex of the struts at point A. In reality the loads are acting at a distance from point A and are producing a bending moment at this point. This bending moment will be taken care of later independently.

In forming the equations below it is to be borne in mind that the type of stress in the members is unknown. It is therefore assumed that they are all in tension. If the answer comes out negative after solving the simultaneous equations that indicates that the strut is in compression. Forces acting to the rear, upward, and inward are considered positive.

Solution for Unit Vertical Load.

Summation V: $.456AB + .939AC + .394AD + 1 = 0$ (1)
Summation D: $-.350AB + 0AC + .551AD = 0$ (2)
Summation H: $.851AB + .350AC + .735AD = 0$ (3)

Multiply Equation (1) by .851/.456 which is 1.862:

$.851AB + 1.749AC + .735AD + 1.862 = 0$ (1a)

Subtract Equation (1a) from (3):

$-1.399AC - 1.862 = 0$

$AC = -1.862/1.399 = -1.33$ lb. (Compression)

Substituting for AC in Equation (3):

$.851AB + .735AD + .350(-1.33) = 0$

$.851AB + .735AD - .466 = 0$ (3a)

Multiply Equation (2) by .851/.350 which is 2.43:

$-.851AB + 1.341AD = 0$ (2a)

Add Equations (3a) and (2a):

$2.076AD - .466 = 0$

$AD = .466/2.076 = .225$ lb. (Tension)

Substituting for AD in Equation (2) and solve for AB:

$.350AB + .551(.225) = 0$

$AB = .124/.350 = .354$ lb. (Tension)

Solution for Unit Drag Load.

Summation V: $.456AB + .939AC + .394AD = 0$ (1)
Summation D: $-.350AB + 0AC + .551AD + 1 = 0$ (2)
Summation H: $.851AB + .350AC + .735AD = 0$ (3)

$.851AB + 1.749AC + .735AD = 0$ (1a)
(3) − (1a) $-1.339AC = 0$
$AC = 0$

---

(1) × .350/.456: $.350AB + (AC = 0) + .302AD = 0$ (1b)
(2) + (1b) $.853AD + 1 = 0$
$AD = -1/.853 = -1.171$ lb. (Comp.)

Subs. in (2) for AD: $-.350AB + 0 + .551(-1.171) + 1 = 0$

$AB = (-1 + .646)/-.350 = 1.01$ lb. (Tens.)

Solution for Unit Side Load.

Summation V: $.456AB + .939AC + .394AD = 0$ (1)
Summation D: $-.350AB + 0AC + .551AD = 0$ (2)
Summation H: $.851AB + .350AC + .735AD + 1 = 0$ (3)

$.851AB + 1.749AC + .735AD = 0$ (1a)
(3) − (1a) $-1.399AC + 1 = 0$
$AC = 1/1.399 = .715$ (Tension)

Subs. in (1) for AC: $.456AB + .394AD + .939(.715) = 0$ (1b)
(1b) × .350/.456: $.350AB + .302AD + .515 = 0$ (1c)
(2) + (1c): $.853AD + .515 = 0$
$AD = -.515/.853 = -.604$ lb. (Comp.)

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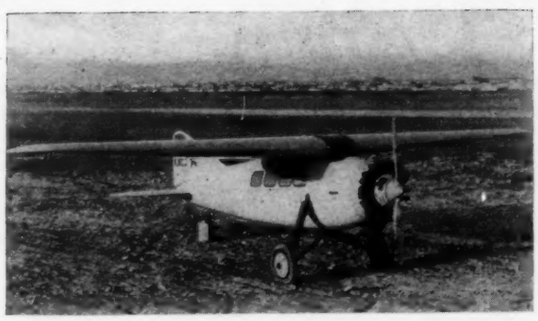

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Subs: in (2) for AD: $-.350AB + 0 + .551(-.604) = 0$

$AB = -(.551 \times .604)/.350 = -.950$ lb. (Comp.)

Stresses in Struts for Unit Loads.

Member	Stress for Unit V	Stress for Unit D	Stress for Unit H
Front Strut AB	+.354	+1.01	±.950
Absorber Strut AC	—1.33	0	±.715
Rear Strut AD	+.225	—1.171	±.604

\+ indicates tension — indicates compression

The unit H stresses are listed plus or minus because the side force may act in or out. Our equations were based on the force acting in. If we had assumed it acting out, the type of stress in the struts would have been reversed but of the same amount.

Bending in Axle.

The front strut AB is usually termed the axle of the chassis. It is a continuous member from the point where it is pinned at the fuselage right out through the hub of the wheel. The shock absorber strut AC and the rear strut AD are pinned where they join the axle and at the fuselage. They are therefore unable to take bending and the axle must take it all. When the axle is inclined forward as it is in our plane it is subject to torsion as well as bending stresses but this is usually neglected on small planes.

There is a bending moment imposed on the axle due to the fact that the loads on the wheel act at the center of the hub, which in our plane is 4 inches out from the strut joint. The vertical and drag forces are applied at this point. The side force acts 12 inches below the axle and it also puts bending in the axle. When the vertical force is acting up, as it always does, and the side force is acting out, which condition must

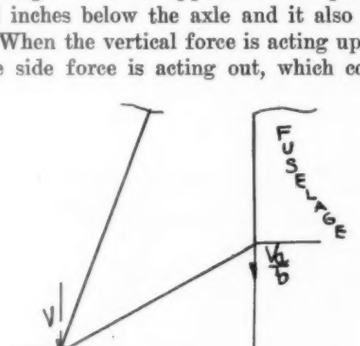


FIG 69.

be investigated, the moments due to the two forces are added together. The bending will be computed later in the analysis of the various conditions. It is to be remembered that the moment arm is 4 inches for the drag and vertical loads, and 12 inches for the side load.

In analyzing the chassis for a unit load we placed this load right at the strut joint. What we were really doing is illustrated in Fig. 69 for a vertical load. The actual load V acting at the center of the hub was replaced by a couple equal to Va and a force V at the strut joint. Now, however, the couple Va requires a reaction in at the fuselage to balance it. The amount of this reaction is Va/b. Then, to balance the vertical forces, we must have a reaction of this same amount, Va/b, acting at the strut joint. In reality, these forces Va/b at the fuselage and at the strut joint are a couple which just equal the couple Va. This is easily shown by multiplying the reactions by the distance between them: Va/b times b equals Va, which is the value of the original couple.

It is then apparent from the figure that we actually have a vertical force V + Va/b acting at the strut joint. In our equations we called this a force of 1 pound and solved. We

must now increase the stresses obtained in the struts by multiplying them by V + Va/b in which V is the vertical component of the design load for whatever condition we are analyzing. A similar multiplication must be made for the stresses due to the drag, namely, D + Da/b. It is evident from Fig. 69 that for our plane a = 4 and b = 28. Then to obtain the true design loads at the strut joint we must multiply the V and D components of our load by (1 + a/b) which is (1 + 4/28) = 1.143V and 1.143D.

In the case of the side load, we have just calculated above that the moment arm of the force is 12 inches. This is equivalent to the quantity a. For the side force, b is measured vertically from the hub of the wheel to the bottom of the fuselage where our axle strut joins. Referring to Fig. 68 this distance is found to be 15 inches. The quantity (1 + a/b) is then (1 + 12/15) = 1.8. That is, the design side load to be applied at the strut joint is 1.8H.

Level Landing Condition.

Gross Weight of Plane	2210 lb.
Weight of Chassis	130 lb.
Net Load on Chassis	2080 lb.
Load Factor (under 2500)	6.5
Design Load on Chassis	13,520 lb.

Load per wheel = 13,520/2 = 6760 lb.

In the Level Landing condition the resultant force is assumed to act along a line through the axle and the center of gravity of the airplane. This line is labeled R in Fig. 68. The vertical component of this line is the force of 13,520 lb. listed above. For one side of the chassis it is half this value, or 6760 lb. The drag component of this resultant may readily be found. Thus:

Length of Resultant = $\sqrt{50.88^2 + 14.95^2}$ = 53.0 inches.
Resultant Force = 6760 × 53.0/50.88 = 7060 lb.
Drag Component = 7060 × 14.95/53.0 = 1980 lb.
Vertical Component = 6760 lb.

These components must be increased by 1.143 to be applied at the strut joint. Their new values then are:

Drag Component = 1980 × 1.143 = 2266 lb.
Vertical Component = 6760 × 1.143 = 7750 lb.

Bending in Level Landing: (Axle takes all bending in this plane)

Bending due to V load. M_v = 6760 × 4 = 27,040 in. lb.
Bending due to D load. M_d = 1980 × 4 = 7,920 in. lb.

Resultant Bending Moment = $\sqrt{27{,}040^2 + 7{,}920^2}$ = 28,240 in. lb. since M_v and M_d are acting in planes at right angles to each other. This result could be obtained by multiplying the resultant load 7150 lb. by the moment arm of 4 inches. This is 7060 × 4 = 28,240 in. lb.

Level Landing—Calculation of Stresses in Struts.

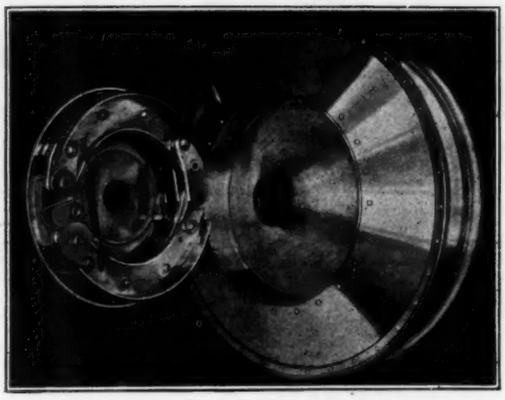
Member		Design V— Comp.	Stress for Unit— V	Stress due to V	Design D— Comp.	Stress for Unit—D	Stress due to D	Stress in Strut
Front Strut	AB	7750	.354	2,740	2266	1.01	2291	*5,031
Absorber Strut	AC	7750	—1.33	—10,300	2266	0	0	—10,300
Rear Strut	AD	7750	.225	1,745	2266	—1.171	—2660	—915

* Axle (Front Strut AB) has bending moment of 28,240 inch lbs.
+ indicates tension — indicates compression

The design V-component multiplied by the stress in each strut due to a Unit V-component will give the total stress in the strut due to vertical loads. The stress due to drag loads is found in the same manner. The V and D components above have been so determined that their added effect will give the load in the strut under the requirements of level landing. This is what has been done in the above table, the stress due to the V-component being added to that due to the D-component and the result listed in the last column.

Level Landing with Side Load.

In this condition the forces are the same as those in level landing with an additional side load applied at the ground. The tire is assumed deflected one-half its nominal diameter. In our case this is 2 inches, as we are using a 28 x 4 inch



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wheel and 4 inches is the nominal diameter. The distance from the axle to the ground will then be 28/2 — 2 = 12 in.

The amount of the side force is to be taken as ¼ of the vertical component in level landing. This is 6760/4 = 1690 lb. This force may be acting either in or out.

Design Side Load = 1690 × 1.8 = 3040 lb.

Level Landing with Side Load—Calculation of Stresses in Struts.

Member	Level	Stress in Strut in Landing	Design H-Comp	Stress for Unit-H	Stress due to H	Stress in Strut
Front Strut	AB	5031	3040	±.950	±2890	*7,921
Absorber Strut	AC	—10,300	3040	±.715	±2180	—12,480
Rear Strut	AD	—915	3040	±.604	±1838	—2,753

*Bending in this strut is computed below.

\+ indicates tension — indicates compression.

The stress in the struts due to the side load H, is added to the stress in them in the level landing condition. As explained before the plus or minus loads depend on whether the side force is acting in or out. To determine the stress in the strut, the sign is taken the same as in the level landing condition and the two figures added. Thus, above, 5031 is positive so plus 2890 is added to it giving 7921 lb. tension in the front strut. In the absorber and rear struts the two negative quantities are added giving the total compression load in the struts.

The bending moment due to the side force alone is:

$M_h = 1690 \times 12 = 20{,}280$ in. lb.

As in the case of the other stresses, that due to bending must be combined with the bending stress in level landing. M_v and M_d have already been computed for level landing. Now M_h and M_v are acting in the same plane i.e. in the plane of the paper if we look at the front view of the chassis in Fig. 68. As was explained before when H is acting out M_h is added to M_v. Thus:

$M_h + M_v = 20{,}280 + 27{,}040 = 47{,}320$ in. lb.

M_d is acting in a plane at right angles to this moment. The resultant moment is then equal to $\sqrt{47{,}320^2 + 7{,}920^2} = 48{,}000$ in. lb. This is the design bending moment in the axle.

Three-Point Landing Condition.

In this condition the loads are divided between the chassis and tail skid in inverse proportion to their distances from the center of gravity. Fig. 70 illustrates how these distances are measured.

R(wheel) = 2210 × 212/236 = 1985 lb.

R(skid) = 2210 × 24/236 = 225 lb.

Weight of Chassis = 130 lb.

Net Load on Chassis = 1985 — 130 = 1855 lb.

Load Factor = 6.5

Design Load on Chassis = 12,080 lb.

Load per wheel = 12,080/2 = 6,040 lb.

This load is acting straight up as shown in Fig. 70. In applying our unit loads and in the previous conditions, the vertical was considered perpendicular to the propeller axis. Our force of 6,040 lb. is acting at an angle of 12 degrees with this vertical. We must then resolve the force into components perpendicular and parallel to the propeller axis to obtain true V and D components. Thus:

V-Comp = 6040 × cos12° = 6040 × .9781 = 5905 lb.

D-Comp = 6040 × sin12° = 6040 × .2079 = —1256 lb.

It is to be noted that the D-Component was given a negative sign. This is because it is acting forward and our convention is that forward is negative. In solving the unit loads we applied a positive drag load and obtained the type and amount of stress in each strut. A negative drag load would reverse the type of stress in each strut. We must then be careful to give the drag component its proper sign.

As in the previous conditions analyzed, the V and D-components obtained above must be increased to obtain the design value. Thus:

Design V-Comp. = 5905 × 1.143 = 6760 lb.

Design D-Comp. = 1256 × 1.143 = —1439 lb.

Three-Point Landing—Calculation of Stresses in Struts.

Member	Design V—Comp.	Stress for Unit—V	Stress due to V	Design D—Comp.	Stress for Unit—D	Stress due to D	Stress in Strut
Front Strut	AB 6760	.354	2396	—1439	1.01	—1453	*943
Absorber Strut	AC 6760	—1.33	—9000	—1439	0	0	—9000
Rear Strut	AD 6760	.225	1522	—1439	—1.171	1685	3207

+ indicates tension — indicates compression

* The bending in the front strut or axle is equal to: 6040 × 4 = 24,160 inch lbs.

Design of Struts and Axle.

We have now calculated the stresses in the struts in the level landing, the level landing with side load, and the three-point landing conditions. The condition in which the strut is most severely stressed is the design condition for that strut. The design load may be readily obtained from the last column of the table for each condition. A strut size must be chosen that can carry the required load and will have some margin of safety. Our struts are pin-ended and therefore only a restraint coefficient of unity (C = 1) may be used in applying the column formulas.

Absorber Strut (AC).

Design Condition — Level Landing with Side Load.
Design Load — 12,480 lb. Compression
Length — 80 inches
Material — Chrome-Molybdenum Steel
Size of Tube — 2¼ -.083 inch
Allowable Load — 14,800 lb. (From Fig. 42 of Chapter 5)
Margin of Safety — 14,800/12,480 — 1 = .187

Rear Strut (AD).

Design Condition — Level Landing with Side Load.
Design Load — 2753 lb. Compression
Length — 38.1 inches
Material — Chrome-Molybdenum Steel
Size of Tube — 1-.058 inch
Allowable Load — 3200 lb. (From Fig. 44 of Chapter 5)
Margin of Safety — 3200/2753 — 1 = .161

Front Strut and Axle (AB).

Design Condition — Level Landing with Side Load.
Design Load — 48,000 inch lb. bending for the hub.
48,000 in. lb. plus 7921 lb. tension for the strut.
Length — Hub = 7 inches Strut = 32.9 inches.
Material — Heat-treated Alloy Steel — 150,000 lb. Ultimate Tension.
Size of Tube — Hub = 1.69 in. diameter (this demension is fixed by hub diameter of wheel 1.697—Table 16). We will therefore use a 1¾-.25 inch strut and turn it down .03 inches at the hub giving a 1.69-.22 inch tube for the hub.

Design of Strut: 1¾-.25 in. tube has $I = .3405$ in.^{4}, $A = 1.178$ in.^{2} as may be found in Tables 4 and 5 of Chapter 5.

$$\text{Required Stress} = \frac{48{,}000 \times 1.75/2}{.3405} - 7921/1.178 = 129{,}820 \text{ lb./sq. in.}$$

Allowable Stress = 150,000 lb. per sq. in.
Margin of Safety = 150,000/129,820 — 1 = .155

Design of Hub: 1.69-.22 in. I for tube = $(O.D.^4 - I.D.^4)3.14/64$

I (hub) = $(1.69^4 - 1.25^4)3.14/64 = .2815$ in.^{4}

$$\text{Required Stress} = \frac{48{,}000 \times 1.69/2}{.2815} = 144{,}000 \text{ lb. per sq. in.}$$

Allowable Stress = 150,000 lb. per sq. in.
Margin of Safety = 150,000/144,000 — 1 = .04

Tail Skid and Shock Absorber System.

The design of the tail skid and shock absorber system will be left for a later chapter in which the control stick, rudder bar, cables, and other miscellaneous items will be analyzed. The next chapter will deal with the analysis of the fuselage.

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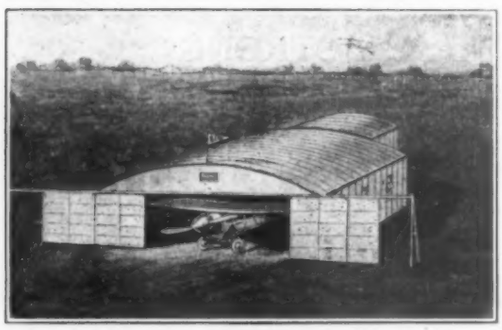

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Now that the "Spirit of St. Louis" has been turned over to the Smithsonian Institution to be placed on exhibit, and they are making preparations for it, we'd like to suggest to the institution officials that they call attention, with a placard, to one very unusual feature of the plane which most people overlook. We refer to the gasoline plumbing system. Just about a year ago, when the ship was at Curtiss Field awaiting good weather for the take off for Paris, we took up about two hours of Colonel Lindbergh's time in getting a story on his plane for this magazine. The plane, he told us, had five different gas tanks, from any one of which gas could be taken to the engine direct. In the cockpit there were a maze of small tubes and fifteen gas cocks, all identical and without any means of identification. "One real hazard for your trip," we said, "would seem to be the chance of forgetting which gas cock you should use next." "There isn't a possibility of that," he said, "I put them all in myself and it was a hard enough job that I could tell you which was which a hundred years from now."

• • • •

Colonel Lindbergh's short temper with newspaper reporters and photographers, so often commented upon today, might better be understood if it is realized that his dislike of some of their methods began over a year ago. "So you're from AVIATION?" he said, "Well, I'll give you a real story and none of this junk the newspapers seem to want. Out west, when I was getting the plane ready, some reporters hounded me night and day asking when I was going off for New York. I told them I had no idea each time they asked, as the plane wasn't nearly ready to go, yet each day they'd print a definite statement that the flight would start next day at a certain hour. After numerous disappointments the people began blaming me and not the newspapers, calling me about everything there was to call. I finally got even with those reporters though. Told them one day I was going off at five A.M. from a field about 10 miles out of town. Even hired a gas truck man to drive out there early in the morning to add color to my story. They all lost half a night's sleep and taxi fares out to the field, while I slept on through."

• • • •

OUR HANGAR FLYING DEPARTMENT

George A. Weis, whom we believe to be connected with the firm of George A. Weis, Inc., in some capacity, told us of his experience in flying back to Garden City, New York, from the Detroit Air Show. He left Detroit for Buffalo, N. Y., without waiting for the weather report, as things looked fair in the vicinity. His passenger in the monoplane asked if he would mind flying low over Niagara Falls so that he could see the view from the air. "Absolutely not," said George, "If we pass over Niagara Falls at all it will be somewhere near the ceiling of this plane. I don't like that place much." They began running into patches of fog after a while, but always managed to fly through them after a short time, so they kept going. Finally just before getting into Buffalo there came a patch of fog that they didn't come out of, so George guessed as nearly as he could at a 180 degree turn and tried to fly out again. This didn't work at all, and after some time of blind flying, he decided he had to have a look at something so he started easing down through the mist. When they did come out of it, they were about 50 ft. up, right over the center of Niagara Falls! "There are your Falls," he said to the passenger, "I was saving this view as a surprise for you."

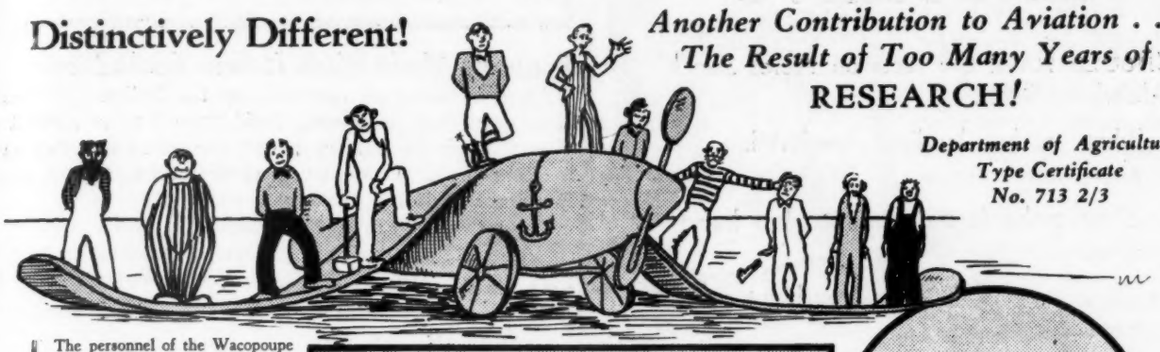
In the interest of accurate and restrained advertising AVIATION *publishes below the first announcement of the Wacopoupe Aeronaughtical Engineering Corporation. In accepting this advertisement the only condition imposed was that it should appear without cost to the advertiser, believing, as we do, that the plane is a distinct contribution to the art and that the manner of its presentation, broadly speaking, is in the interest of more and better advertising.*—THE EDITOR

The Travelrock No-Purpose All-Concrete Monoplane

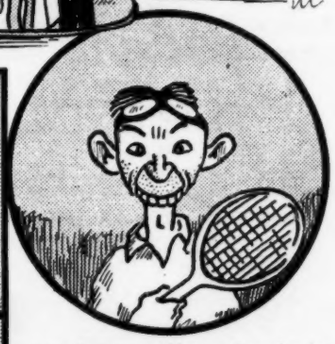
Distinctively Different!

Another Contribution to Aviation . . .
The Result of Too Many Years of
RESEARCH!

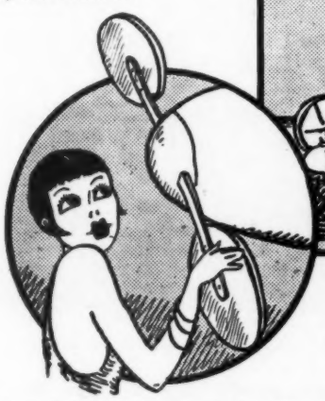
Department of Agriculture
Type Certificate
No. 713 2/3



The personnel of the Wacopoupe Company demonstrating the structural strength of the Travelrock. Adolph Schmaltz, president and wind tunnel superintendent, is seated twelfth from the left. Four weeks after this picture was taken the plane was still in the same splendid condition.

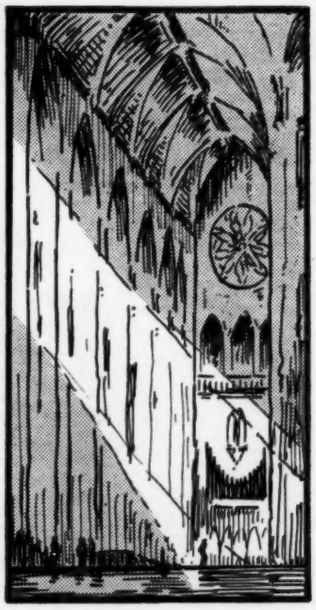


Oscar Eggnog, world famous channel swimmer, who once really sat in a Travelrock, says, "Ay lak 'im swell, das is a peach!"

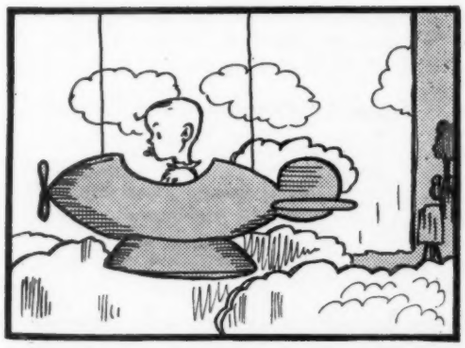


Testimony of the unusual performance of the Travelrock under all conditions is contained in a letter from Hermann Zoxwpmyv (pictured above with his recently purchased Travelrock) stating that he broke the outside loop record when a still in an adjoining hangar blew up. He says, "The climb of my Travelrock is unbelievable. It left the ground like a heliotrope."

Lotta Greasepaint, famous motion picture artist, swinging the propeller of her very own Travelrock. Miss Greasepaint is but one of many celebrities who are proud owners of Travelrocks. Some of them include Rin Tin Tin, the Smith Brothers, Doctor Cook and several of Singer's midgets.



An interior view of a section of the cabin of the Travelrock No-Purpose Monoplane. Note the excellent head room, splendid acoustics and balcony which allows the passengers to talk to the motorman.



Tintype of Oswald Aileron, designer of the Travelrock, taken at the age of eleven months while making wind tunnel tests on his sixth and most successful design up to that time.

Look to the Skies and Yawn

NOW that man has wings, at least on his lapel, he is no longer forced to remain among earth-bound things. Think of it...the broad highways of Heaven...the undescribable joy of soaring above the clouds...(Oh the beauty of it).

A light touch on the joy-stick and you are racing through billowy masses of whiteness or zooming high up into the blue ...to do this with a Travelrock would be marvelous... wonderful...a miracle!!!

SPECIFICATIONS: *Span*, around 35 feet; *Length overall*, 36 deg. Fahrenheit; *Height*, four score and ten years; *Weight empty*, total weight less pay load; *Pay load*, total weight less weight empty; *Total Weight*, pay load plus weight empty. PERFORMANCE (according to blueprints): *Top Speed*, very, very fast; *Cruising Speed*, very, very slow; *Landing Speed*, why not? (These figures are the same with any make of fuelless engine). PRICE: $.2986, Tow Away, Sandwichyta.

WACOPOUPE AERONAUGHTICAL ENGINEERING CORPORATION
Contractors to the Salvation Army

Look for the trade mark on the tail skid. Ask the man who owns one why he owns one.

Every Pilot *and* Executive

SHOULD HAVE the facts on Aerol Shock Absorbing Struts.

—They make landing comfortable — always.

—They make forced landings less hazardous.

—They protect the plane and cut maintenance cost.

Write today for illustrated booklet.

CLEVELAND PNEUMATIC TOOL CO.
3737 E. 78th St., Cleveland, Ohio

AEROL *shock absorbing* STRUT

DESLAURIERS CONSTANT SPEED PROPELLERS

. . . For

Driving Aircraft Radio Generators and Other Power Requirements

USED BY Commander Byrd, on both of his epoch-making flights, also used on many other notable long-distance flights, functioning perfectly, at all times. Used by United States and foreign governments.

Operates at constant speed, regardless of air speed. Head resistance only 25% of fixed-pitch propeller, — weighs less than any other radio system, — rugged in construction and operation. *Full details upon request.*

DESLAURIERS COLUMN MOULD CO., INC.
WOOLWORTH BLDG., NEW YORK CITY

FOREIGN NEWS

By Special Arrangement with the Transportation Division Bureau of Foreign and Domestic Commerce

Progress Made With Italian Built Planes

Types of airplanes now used by the Italian Air Force indicate that Italy is freeing itself from foreign aircraft supply. Though the country is still dependent on other nations for commercial planes, seven of nine types used in the Air Force are of Italian make.

These seven are: 1. Night bombers, Ca-73 Caproni twin engined, Isotta Fraschini; 2. Day bombers, Fiat Br-1 with Fiat 700 hp. engine; 3. Observation planes, Ansaldo A.120 with Fiat A.22 500 hp. engine; 4. Fighters, Cr-20, Fiat with Fiat A.20 400 hp. engine; 5. Sea bombers, S.55, Savoia, Santa Maria type, twin engined, I.F. Asso; 6. Observation seaplanes, S.59, Savoia, with I.F. Asso engine; 7. Fighter seaplanes, Macchi M.7 ter.

The only types in service built on foreign design are the Ro-1 (Romeo) observation aircraft fitted with Jupiter 500

An Italian Cr-20 Fiat Fighter.

hp. engine (Fokker license); and the Ac-3 Ansaldo fitted Jupiter 400 hp. engine (Devoitine license). The latter is soon to be replaced by Cr-20 planes.

Several metal planes are being tested with a view to replacing those built of wood. The Ca-73 is to be replaced by the Ca-90, Ca-79, or by the Breda planes. The BRG Fiats are to take the place of the Br-1 planes. Many other types of aircraft built along Italian lines are being designed.

Donates International Model Trophy

Sir Charles Wakefield, Bart., English patron of aeronautics, has presented to the Society of Model Aeronautical Engineers of England a handsome silver cup as an international trophy to be competed for annually under rules drawn up by the society. The first model airplane competition at which the cup will be offered will be held at Hendon, London, on Sept. 22, 1928.

All entries are to be made through the society in each country affiliated with the International Aeronautical Federation through such a society's model section, or through the model building society recognized by such an affiliated society. Though entries must be made through a qualified society, it is not required that entrants be members of the group through which the application is made.

Planes Entering Canada Taxed But Once

A report from L. W. Meekins, commercial attache at Ottawa, Can., states that airplanes upon which duty has once been paid may thereafter enter Canada free. Planes granted free subsequent duty must, however, remain the property of the exporter. Proof, furthermore, must be shown of the or-

iginal payment of duty, and repairs or additions to such airplanes made following the first payment are subject to the original tax.

Italy Plans Trieste-Genoa Service

A new air service connecting Trieste and Genoa is planned in Italy, according to reports from Vice Consul John E. Holler at Venice. The new service, as is proposed, will have tri-engined planes.

The plans of the company when carried into effect will be as follows: The Trieste-Genoa line will be the main line using new large planes; daily service will be maintained between Zara-Porto Rose-Trieste-Venice-Pavia (Milan) and Turin with small seaplanes as at present. On the days when the large planes run, the Zara-Trieste line will act as a "feeder" with smaller planes and the service from Pavia to Turin will be undertaken by the smaller planes while the large express main plane will continue to Genoa.

Germans Offer Prizes for Glider Flights

Prizes for the best glider flights from the dunes of the Kurische Haff, the Baltic coast of the Samland, and the Kurische Nehrung, points lying near Koenigsberg, Germany, have been posted for international competition. The awards will be available until March 15, 1929.

A provision that no prizes for duration flights less than 14 hr. 22 min. and covering less than 90 kilometers, or about 55 mi., has been placed in the rules. Marks such as these have been made in previous glider flights hence to win the competition these records must be attained.

Congo Aero Company Reports Progress

More than 100,000 mi., it is reported, were flown by Belgian Congo planes of the Sabena Air Co. during the first 10 months of 1927. According to the company's plans, approved by the colonial office, routes will be opened this year between Coquilhatville and Uele, a distance of 558 mi., and between Lusambo, Kabalo, and Kongola, a route of some 372 mi.

Americans in Berlin Get News by Plane

Delivery of the *Paris Herald*, European edition of the *New York Herald Tribune*, from Paris to Berlin by airplane has been inaugurated. News from home is thus brought to Americans in the German capital before noon of the day the paper is issued. The planes arrive at Tempelhof Airport, Berlin, at about 11:30 A.M., a saving of seven or eight hours on former deliveries.

Bolivian Government Aids Air Line

The Bolivian Government is turning over a fund of 50,000 bolivianos, or about $20,000, to the Lloyd Aereo Boliviano, an air mail and passenger company operating six Junkers monoplanes between Cochabamba and eastern cities. Improvements in the service in the interior of the country will be made with the fund.

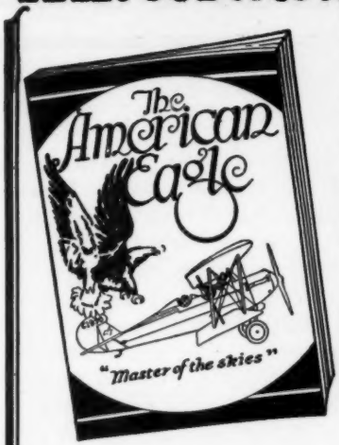
Non-Stop Paris-Berlin Service Inaugurated

Europe's longest commercial non-stop air service was recently begun when 5 hr. 30 min. flights between Paris and Berlin were inaugurated by the Luft Hansa and Farman companies. These non-stop flights result in a saving of 11 hr. 30 min., since express trains require 17 hr. to cover the distance.

Canadian Airports in Shape for Summer

Announcements have been made by the Mayor of Edmonton, Alberta, and the City Clerk of Calgary, Alberta, that airports at their respective cities are now in good condition for the reception of visitors this summer.

A Record to be Proud of



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The *American Eagle* has never been defeated in any performance contest.

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We want you to own an *American Eagle* because we know you will be as proud of its amazing performance, maneuverability and beauty as we are in the privilege of building it.

With OX5 Motor, Hartzell Propeller, Burnished Aluminum Cowling — — $2885, Kansas City

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MODERN AIRCRAFT

DESIGN—CONSTRUCTION—OPERATION AND MAINTENANCE

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U. S. Air Corps Reserve

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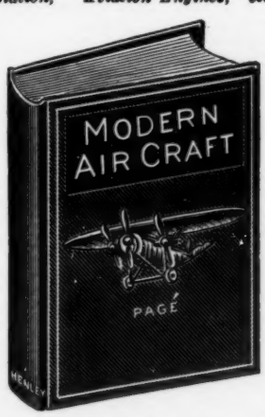

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500 *Illustrations*

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AVIATION PUBLISHING CORPORATION
250 West 57th Street, New York

AIRPORTS AND AIRWAYS

Dallas, Tex.

By Rorie E. Cowden

Howard Woodall and C. W. Shaw, state distributors for the Travel Air, recently made a trip to the factory at Wichita, Kan., in an OX-5 Travel Air. Woodall says the enrollment of students and the sales of planes are holding up well considering the unusually inclement spring season in Texas.

Arthur J. Reinhart, street commissioner of Dallas, is the first of the city officials to actually take to the air. Commissioner Reinhart has completed his flying course under the instruction of Lieut. Harry Weddington. This is probably a lead for other officials to follow as it has been announced that district attorney William McCraw will purchase a plane for the use of the district attorney's office.

The "Voice of the Skies," a tri-engined Fokker equipped with a specially constructed radio transmitter and amplifier, recently made its appearance ot Love Field. Built in the fuselage are three large speakers. A voice can be distinctly heard while the plane is cruising at an altitude of 3,500 ft. The plane is being used for advertising purposes. Lew Gower, pilot, Lou Gordon, mechanic, Geo. W. McCauley, inventor of the radio equipment, and Freddie Bell, announcer, were guests at the regular meeting of the Dallas Flying Club. These boys were all well pleased to learn that Dallas had purchased Love Field as a municipal airport saying that it was one of the best landing fields they had visited anywhere.

Garza Wooten, well known Texas flier and former war pilot, is now connected with Good & Foster of Dallas. Wooten and Good served during the war together and later both were connected with the Curtiss Southwest Airplane Co. at Tulsa, Okla. Good & Foster has purchased a Ryan Brougham powered with a Hisso, which will be used for passenger and cross country work. The plane was piloted in by Wooten from Tulsa.

Herbert Kindred, who has been an air mail pilot for the N.A.T. since the inauguration of the Dallas-Chicago mail route, left recently for Cincinnati where he will take charge of a commercial air line operating out of that city.

The city of Dallas is contemplating the purchase of another landing field which will be used by the reserve officers' training corps. Present plans call for the field to be located just north of Love Field. This will separate the military and commercial flying activities and should be a great help to both.

Garden City, L. I., N. Y.

By M. Brown

Out of a leaden sky, with raindrops beginning to splatter, came the Ford plane containing the trans-Atlantic fliers, Baron Gunther von Huenefeld, Capt. Hermann Koehl, and Maj. James Fitzmaurice. They were supposed to be winging their way to Washington on April 27, so their descent on Curtiss Field at 1:30 P.M. was somewhat unexpected. The Jennies, in which students were taking instruction, were all hurried in for landings when the huge plane was sighted. Scarcely a hundred people were gathered at Curtiss Field, but they crowded around the plane as soon as it came to a standstill.

Bernt Balchen, pilot, descended at once from his cockpit, but the fliers remained in the bare cabin while the plane was being refueled. Filled with luggage, the cabin did not look as if it could have been a very comfortable place for four persons, during the seven hour flight from Murray Bay, yet they appeared to be in good humor. Fitzmaurice's red flying coat made a bright splotch of color. The Baron leaned against the wall, adjusting his monocle. Koehl sat on a suitcase and read with intense interest a German newspaper—which

Captain Koehl, Major Fitzmaurice, and Baron von Huenefeld, east-west Atlantic fliers, land at Curtiss Field, L. I., N. Y., in the Ford Relief Plane piloted by Bernt Balchen. Only a few who knew of the coming of the Bremen crew were there to meet the Tri-Motored Ford, as the photo shows, on this initial arrival in New York from Canada.

Herta Junkers presently took away from him. The remainder of the trip to Washington, however, had to be made by train.

Clarence Chamberlin flew into Curtiss Field in a Fairchild cabin plane shortly after the Ford relief plane landed, but he soon took off again.

Curtiss has started a new course of cross-country instruction, using a Fairchild plane for the training. William Winston made the first instruction flight when the new course was initiated.

Ithaca, N. Y.

By Donald W. Exner

Since its organization last fall the Cornell Flying Club has helped to arouse considerable interest in aviation in the University and in Ithaca. The attempt of the Club to cause the institution of an aerodynamics course in the Sibley College of Engineering at Cornell University fell through because of the fact that the faculty was temporarily short-handed, but the outlook is bright for such a course next fall. Attendance at Prof. Frederick Bedell's Elementary Aerodynamics course in the Department of Physics and Prof. G. B. Upton's Automotive Engines course in the School of Mechanical Engineering has been greater than in previous years.

At the winter meetings of the club it was possible to obtain a number of well qualified speakers on aviation topics. Among these might be mentioned C. I. Millard, who described the principle of the Handley-Page slotted wing, Professor Upton, who spoke on "The History of Aviation Engines", and Prof. F. O. Ellenwood, who described and illustrated some phases of aviation engine development. Professor Upton was closely connected with the development of the Liberty engine during the War, while Professor Ellenwood was in charge of the aviation engine section of the ground school at that time. As a matter of interest, this ground school at Cornell was one of the first to be started after America's entrance into the war. Ithaca is also the home of the Thomas-Morse planes which our war-time fliers knew so well. W. T. Thomas, of the Thomas-Morse Aircraft Corp., has accepted the invitation of the club to speak at its next meeting.

Elmira, N. Y.

By Wells Crandall

Alfred E. Stanley, head of the Stanley Airways, Inc., of this city, commercial operator, has purchased two new Waco 10's for use during the summer at the Elmira Airport. He expects to sell the Waco 10 which he purchased last summer. Ralph Haynes, Mr. Stanley's pilot, flew the planes from the Advance Aircraft Co.'s plant in Troy, O., to the local airport.

The Southern New York Flying Club, recently organized, has adopted the "Gosport System" of flying instruction, used by the U. S. Army, for the training of its student pilots. Several business men have joined the club to take advantage of special rates offered for the use of planes. Edward A. Mooers is temporary president of the organization.

"Air Mail Week" will be conducted in Elmira during the last week in June in an effort to create sufficient interest in air mail to warrant the placing of this city on one of several proposed routes. Plans are now under way for bringing several nationally known fliers to this city.

Spokane, Wash.

Air mail business of the Spokane postoffice has shown substantial increases each month this year, according to figures recently compiled by Thomas J. Smith, postmaster.

In January 6753 pieces of air mail, weighing 158 lb., were sent out. In February figures increased to 7518 pieces, and 178 lb.; in March 8660 pieces and 208 lb., and in the first 15 days of April 4203 pieces and 104 lb. Three Sundays in the

Austin Designs and Builds Aviation Buildings

AUSTIN designs, constructs and equips efficient hangars, factory buildings and other structures at *low* cost.

Austin guarantees total cost, completion date and quality of materials and workmanship.

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Plane Talk

— Tags like these, attached to every Travel Air Ship, are filled out and returned by the owner on arriving at destination.

FLIGHT RECORD

From Wichita to BOSTON, MASS.
Left Wichita Mo. 3 Day 23 Hour 2.45 PM
Arrived BOSTON Mo. 3 Day 25
Hour 2.00 PM Distance ____ miles.
Flying time—Hours 16 Minutes 33
Average speed . . . . ____
Amount of gas used 6½ P.HR. 104 GAL.
Amount of oil used . . 1 GAL.
Interesting and unusual happenings enroute:
THREE STOPS ONLY
SEDALIA MO. KOKOMO, IND.
AND AVON, N.Y.
Signed B.F. BILLINGS
Address BOSTON AIRPORT CORP.
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Designed and perfected after many tests by air mail pilots.

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SCULLY BROS., Inc., 725 E. Washington St., Los Angeles, Cal.
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Can You Fill This Position ?

A FINANCIALLY responsible company, operating large passenger ships for sight-seeing and taxi work, also acting as distributor for new airplanes, wishes to obtain the services of an experienced hustler, capable of managing an airport in the promotion of business, sale of airplanes etc. He must have general executive ability. He must be a pilot with at least 1000 hours "in the air", know Liberty engines and must have a clean record.

This is a big job with a big future. The right man will make a profitable connection. References required.

Address Box 883-Q, AVIATION.

first 15 days of April kept the figure down, but in both pieces and pounds the month is expected to better any previous figures.

Two more Waco 10 airplanes were sold recently by Pilot N. B. Mamer of the Mamer Flying Service, Spokane, which has the Spokane agency for the Waco and Buhl type of planes.

Both of the planes were purchased by Pacific coast commercial flying organizations, one of them being the Port Angeles Flying Service and the other the St. John Air Service from Chenalis.

Centralia, Wash.

Work of grading the new Centralia, Wash., airport has been started. Plans for the new field include construction of a hangar. The Davis Brothers, graduates of the Rankin School of Flying in Portland, Ore., contemplate establishment of a school at the new field.

Toledo, O.

By David B. Hoag

Richard Wall, president of the Toledo Transfer Co., and member of the National Safety Council, recently returned from a nation-wide trip in the New York American's Stinson monoplane. "Dick" is much in demand now by luncheon clubs and other organizations.

"Aviation—The New Industry", was the subject of a talk given before the recent manufacturers dinner in the chamber of commerce by C. M. Keys, president of the Curtiss Aeroplane and Motor Co. Keys formerly was an official of the Willys-Overland Co. and is highly regarded as a speaker on manufacturing subjects.

The Toledo Trans-Continental Airport is located one-half mile south of the village of Walbridge, O., and one mile east of Moline. This fact has caused the former village to demand that the field be designated as "near" Walbridge. Its chamber of commerce has served formal notice of its protest on all newspapers in the vicinity.

Pilot G. P. Rogers, operating on the Ford air mail contract line between Detroit and Cleveland, was forced down by fog and rain near Oak Harbor, O., recently. He was carrying 1200 lb. of freight and two sacks of mail. A safe landing and later take off was made. The mail was forwarded by train.

Upper Sandusky, O., a small city on the lake between Toledo and Cleveland, will paint its name in 14 ft. letters atop the Citizens' Savings Bank building there. An arrow pointing north also will be painted on the roof.

Harold R. Mull, chief pilot for the Becker Roofing Co. will spend several days here mapping the downtown and factory districts for his company.

One of the large Fokker planes now being completed in New York for the Western Air Express will stop at Toledo on its way to California, it was announced recently.

Cincinnati, O.

By Charles E. Planck

Every member of the Embry-Riddle Co. at Lunken Airport, flew to the All-American Aircraft Show at Detroit, and during the week, Embry-Riddle planes carried 16 Cincinnati visitors to the show.

The Ryan Brougham and the Stinson Detroiter biplane of the company were kept busy all week ferrying company members and fares to Detroit. Okey Bevins made one trip with two passengers in a Whirlwind Waco mail plane. John Paul Riddle, Stanley C. Huffman, and Warren Vine piloted the other planes. Students in the Embry-Riddle Flying School were all urged to attend the show and eight visited Detroit.

Cincinnati was well represented at the show, a special trainload of 52 business men making the trip on Wednesday of

show week. They comprised the official recognition of the four Cincinnati firms represented at the show. These included LeBlond engine exhibit, with three of its new radial air cooled engines on display, the International Aircraft Co., with a cabin and an open job on the floor, the new Halpin Flamingo, a Cincinnati product, and the Embry-Riddle Flying School.

Cincinnati firms declared the show a fine success, orders being received at every one of the Cincinnati companies' displays. Through interest aroused by its essay contest, for which a flying course was given free to Miss Marion Taylor, West Detroit newspaper woman, for the best essay on "Why I Want to Learn to Fly," some 300 new students have been enrolled in the Embry-Riddle Flying School.

Cleveland, O.

Announcement was recently made of a municipal lake front airport to be constructed for the City of Cleveland in the near future. The site for the new airport will be the tract of land reclaimed from Lake Erie by the New York Central and the Pennsylvania railroads which is soon to be exchanged for another tract of land belonging to the city. The airport would be located virtually in the heart of Cleveland.

The site comprises more than 60 acres and runs on a line 2,000 ft. south of and paralleling the government breakwater. The new port will provide runways of 2,000 and 2,500 ft. in length.

Brook Park Airport will be further developed, Manager Hopkins stated, to handle the bulk of the city's aerial traffic in conjunction with the new airport.

Detroit, Mich.

By John T. Nevill

William S. Brock and Edward F. Schlee, co-pilots on the flight of the "Pride of Detroit" to Tokio, Japan last fall, flew the "Pride of Detroit" to the Shriners convention recently held in Miami, Fla. Other occupants of the plane on the journey south were Dewey S. Schlee, brother of "Ed," James Dickson, Jr., M. A. Dandero, and Louis Rose, all of Detroit. The engine of the famous Stinson monoplane was given an overhauling at the Stinson plant just prior to the Miami flight.

Miss Marion Taylor, 23 yr. old art editor of the *Detroit Free Press*, winner of the flying course offered by the Embry-Riddle Flying School, Cincinnati, during the All-American Aircraft Show here, plans to leave for Lunken Airport, Cincinnati, soon to begin taking instruction. She plans to spend about two months taking the course and will return to Detroit as the only newspaperwoman-aviatrix in the city. Miss Taylor won the flying course by writing an essay on "Why I Want to Learn to Fly."

Niagara from the Air

Negotiations are said to be under way whereby Stout Air Services, Inc., of Detroit, will supervise operation of Sky-View Lines, Inc., an airplane sightseeing project organized for the viewing of Niagara Falls. Operation will begin about May 30. The new company has ordered a tri-motored Ford monoplane. Directors of the company include William B. Stout, J. L. Woods, and James E. DeVoe, all of Detroit, and Fred J. Coe, of Niagara Falls, N. Y.

Edward S. Evans, chairman of the Board of Commerce Aircraft Events Committee, has left on a month's airplane business trip through the South and West. Mr. Evans expects to visit cities in Missouri, Oklahoma, Texas, Arizona, California, Oregon, and Washington before returning to Detroit about May 20. Jack Price will pilot him in a Stinson monoplane belonging to the "Wise Birds" organization.

Carl B. Fritsche, general manager of the Aircraft Development Corp., was a recent speaker before 300 students of

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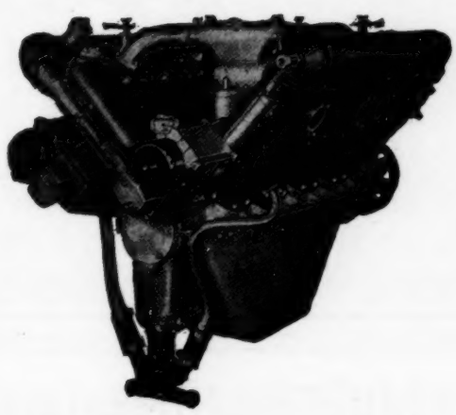

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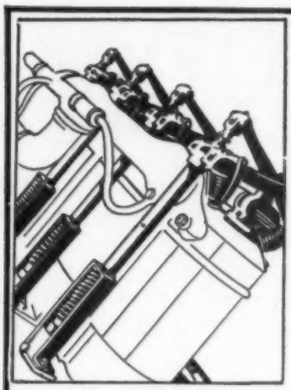

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Eastern High School, Detroit. He spoke on the opportunities for young men in aviation.

The Union Trust building management has placed a 28 x 60 ft. aerial marker on the roof of their building. The marker is said to be plainly visible from an altitude of 5,000 ft.

Portland, Ore.

By John W. Anderson

May 15 has been set by J. G. "Tex" Rankin as the date for the start of regular airplane passenger and express service between Portland and Yakima, Wash. Plans call for round trips six days a week. The two Ryan monoplanes of the Rankin Flying Service will be used on the run.

The Portland Chamber of Commerce is actively supporting the venture. Letters have been mailed out to all merchants of the city urging them to patronize the line.

Twenty-five graduates of the Mackenzie-Goff Aviation School in Portland have organized to cut the cost of acquiring hours of flying necessary to qualifying for transport pilot's licenses. The men will invest about $100 each with which to buy a plane. Costs of operation are to be pro rated among them. With this plane they hope to pile up all the hours of flying needed.

Tex Rankin plans to enter two or three planes in the aerial circus to be staged at Walla Walla, Wash., May 26 and 27. Prizes aggregating $1500 are offered.

The Tacoma Airways Co. of Tacoma, Wash., the Grays Harbor School of Aviation, Aberdeen, Wash., and the Litzenberg School of Flying, Pittsburgh, Penna., have adopted the Rankin system of flying instruction, according to J. Keggeries, general manager of the Rankin School.

Capt. Frank Mercer, mapping expert for Continental Airways of Portland, has been busy mapping a large tract of timber for a California lumber company. He works in a Ryan monoplane piloted by Lieut. Gordon E. Mounce, chief pilot and general manager of the company.

Roseburg, Ore.

Oregon Agricultural College experts have been called into conference on plans for the new flying field at Roseburg, Ore., for which $25,000 worth of bonds were voted recently. F. E. Price, soil specialist, is studying the ground on the site with a view to recommending proper drainage facilities and the best variety of grasses for sodding. The college will be called upon for other technical advice.

Oklahoma City, Okla.

By Ernest W. Fair

J. L. Maddux, president of the Maddux Air Lines Co. of Los Angeles, was in Oklahoma City recently on a business trip with his wife, Larry Fritz, J. Miller, Mr. and Mrs. A. A. Alden, and Mr. and Mrs. J. L. Kerwin of Los Angeles. Maddux, while here spoke of plans to establish an airline eastward from Los Angeles through Oklahoma City.

H. C. Martin of the aviation committee of the local chamber of commerce has announced that radio equipment for handling the weather reports and auxiliary despatching service will be installed at the airport by July. H. W. Parker has been named as special airways observer.

R. H. Tarbutton, Oklahoma City sales representative of the Alexander Eaglerock Co. has been selling many planes in this territory.

Three hundred employees of the McEwen Halliburton Co., local drygoods concern, were given free rides recently at the local airport as guests of their firm. Automobile buses were provided for the employees, the event being in charge of John McCreery of the company.

The Central Aero Club has been informed at Central High School and is building model airplanes as one of its principle

activities in learning the principles of aeronautics. The club meets in one of the manual training rooms of the high school every Wednesday afternoon with Paul Bell, electrical radio instructor and C. A. Parker as sponsors. The aero club members are Wendall Bailey, Bill Garnett, Jack Peckham, Robert Brown, Wayne Thomas, Mossman Collins, Bill Stover, Ed Roy King, Delvin Hanson, Paul Sheefer, Perry Griffin, Jacob Picow, Dan Lackey, Orville Mills.

Duncan, Okla.

Duncan is another one of the enterprising small towns of Oklahoma that is planning on development aeronautically. Small towns of Oklahoma have nearly all arisen to the occasion of aeronautical development Duncan being one of the first to act.

The city has recently acquired a municipal airport of 40 acres of land adjoining the fair grounds just south of the city. These 40 acres were bought at a price of $100 an acre, it has been reported.

Duncan, having bought its air field and equipped it, is now asking for a place in the state air tour. Ben F. Sayre is chairman of the aviation committee of the Duncan Chamber of Commerce, and has been very active in all aeronautical work.

Hobart, Okla.

The chamber of commerce here has signed a five year lease on a 60 acre tract to be used for an airport, and work has been started on the field to condition it for the state air tour of the Oklahoma State Chamber of Commerce which is to arrive in Hobart about May 15. Two planes are owned by Hobart fliers and three more have been ordered. Plans are now under way to mark the new field in the manner required by the Department of Commerce for temporary landing fields.

Hasbrouck Heights, N. J.

Report on the activities at the Teterboro Airport for April shows a decided increase in air traffic over that of the previous month.

During the month, 43 airplanes utilized the airport: 25 airplanes arriving from, and 18 departing for, many other points in the United States and Canada. In all, they carried 35 passengers, in addition to baggage, freight, parts, etc.

In order to meet the ever increasing demand for joy hops and to accommodate its many students, the Gates Flying Circus and Flying School, which operates daily at the airport, has augmented its fleet of aircraft by two new "Challengers."

Not listed on the above report are the many short hops made at the field by the Fokker 12 passenger F-10, huge three engine monoplane recently built by the Atlantic Aircraft Corp., whose factory is adjacent to the airport. These flights included trips over Manhattan with many notables, among whom were Charles A. Levine, Rear Admiral Cohn, U.S.N.R., of the Guggenheim Fund, etc., and also, a trip to Washington and back.

The practicability of Teterboro Airport as the New York air terminal was again demonstrated during the month when several air transportation services landed here for the purpose of delivering films.

Airplanes of many types and makes were seen around the field: Bellanca, Fairchild, Fokker, Ford, Stinson, Travel Air, Curtiss, Waco, and the famous old Jenny.

Winston-Salem, N. C.

By Robert Carmichael, Jr.

With the arrival of new equipment for Miller Municipal Airport here and the announcement that Reynolds Aviation, of North Carolina, Inc., the lessee, has closed contracts as sales representatives for several makes of planes, aviation interest locally is showing a decided pick-up.

A Fokker Universal four passenger cabin monoplane has

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just arrived and is proving quite popular. It has been busy with short hops and some rather extended flights have been made. The plane has been chartered for several-day trips to local parties, the trips to be made shortly. The monoplane was piloted to Winston-Salem from Curtiss Field, N. Y., by August Haucke and is being handled here by Lewin McGinnes, manager of the airport.

Much improvement has been made in the field during recent weeks and a force of men will be kept busy until it is in the best possible condition. New sod has been placed along the edges of the field, where small washes occurred and the entire landing space is being smoothed over.

Lincoln, Neb.

By Duncan Price

While returning to Washington, D. C., from San Diego, Calif., where he delivered a new Amphibian plane to the airplane carrier *Saratoga*, Lieut. Comdr. Leslie C. Stevens, United States bureau of aeronautics and the naval construction department, recently landed at the Lincoln aviation field and visited with relatives.

Lieutenant Commander Stevens is a former Lincoln man and student at the University of Nebraska and Nebraska Wesleyan University here.

Stevens Tests and Designs Airplanes

During the Navy's attempted flight to the Hawaiian Islands several years ago, Mr. Stevens was in charge of the airplane searching for the lost plane. He was then stationed on the old airplane carrier *Langley*. Since earning his pilot's wings five or six years ago he has used his skill in testing planes as well as designing them. He has been in the Navy nearly 20 yr.

Jimmy Angel, Fresno, Calif., flier on a 25,000 mi. Pan-American flight, learned to fly at the aircraft school here where Col. Charles Lindbergh took his training.

Angel "blew in" from Texas several years ago with a desire to learn aviation and nothing else, Ray Page, president of the Lincoln Standard Aircraft Co. and flying school recalls. Although a "dare-devil" type Angel soon developed into a fine mechanic and a capable flier.

After patrolling the streets for five years as a traffic policeman, Paul Shively has forsaken his motorcycle for aviation. He has accepted a position in the assembling department of the Lincoln Aircraft Corp. and intends to work through the airplane manufacturing departments into the sales division.

Shively has always had a keen interest in aviation and during his vacations took short courses in flying. He has had 12 hr. of flying instruction, chiefly in cross-country work.

Pittsburgh, Penna.

By Ray A. Tucker

Pittsburgh just recently became a link in a chain connecting with a nation-wide airway express service, when Dewey Noyes, air mail pilot, took off for Cleveland from Bettis Field in an express-laden Ryan monoplane.

The event was preceded by appropriate ceremonies witnessed by more than a thousand spectators. The program consisted of short addresses by Mayor Charles H. Kline, Clifford Ball, the Air Mail & Express Contractor, and the following officials of the American Railway Express Co.: Vice President C. W. Robie, Gen. Mgr. F. J. Hickey, and J. W. Johnston, local district manager.

The Aero Club of Pittsburgh which just recently announced its plans for holding its Third Annual Boys Model Airplane Contest, has decided to adopt the rules of the National Miniature Aircraft Tournament which has been sanctioned by the

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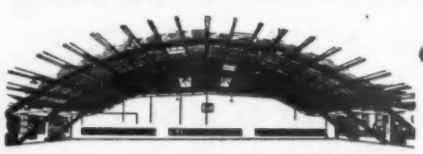

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Playground & Recreation Association of America, and thus give the winners a chance to compete in the national finals at Atlantic City in October.

Madison, Wis.

By H. C. Brunner

Orders for the purchase of six Travel Air biplanes from the Mid-West Air Transport Co. of Madison were signed in Beloit recently by the Beloit Airway Co. W. A. Hansley, president of the Mid-West Air Transport Co. of Madison secured the orders. The Madison company is state agent for the Travel Air planes.

Eugene E. Crowley, a brother of Leo T. Crowley, Madison, is president of the Beloit Airway Co. Its stock is controlled by Beloit business men and it uses an 88 acre landing field which is in the midst of a 400 acre farm near Beloit.

Included among those who have recently signed orders with the Mid-West Air Transport Co. for planes are L. C. Hoffman, Madison insurance man; Robert Butzlaff, Richard Lutz, Henry Dunbar, and the Oshkosh Airport, Inc., all of Oshkosh; and Henry Gerald of Appleton, Wis.

Superior, Wis.

The Head of the Lakes Flying Club, which was organized a short time ago, is meeting every Wednesday evening to discuss the various phases of commercial aviation. At the present time the members are studying the design, construction, assembly, operation, and maintenance of several well known airplane engines. The meetings, which alternate beween Superior, Wis., and Duluth, Minn., are under the direction of Walter Burdash as president, Hank O'Hara is vice president, Joe Leary is secretary, and L. S. Briggs the treasurer.

Port Sanilac, Mich.

A 60 acre airport is planned by this tiny Michigan village of 135 people. Latest equipment comprising night beacons, post lights and other apparatus will be installed at the new airport. Village authorities are being aided in planning the airport by Jack Workman of the Michigan State Aviation School, Detroit.

Minneapolis, Minn.

By Joseph H. Ball

The way to the acquirement of a municipal airport by the city of Minneapolis was finally cleared recently by the approval of the city's board of estimate and taxation of a $115,000 bond issue to take care of the cash payments on the purchase.

The city's park board approved the purchase of Wold-Chamberlain Field for use as a municipal airport some time

Like Father, Mother, and Child

A veritable family of eagles was presented when these planes were recently gathered on the San Antonio, Tex., municipal airport; but A. P. Herff, who designed the midget plane on the left, calls his craft the "Canary", hence the designation is wrong. The large monoplane is a Ford-Stout, while the plane in the foreground is a Ryan Brougham.

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ago, but the project had to pass the board of estimate and taxation before funds could be secured. The contract calls for cash payments of $90,000 to the owners of Wold-Chamberlain Field and of $25,000 to the owners of adjacent land to be included in the airport. A 20 yr. mortgage, bearing five per cent. interest, will take care of the remaining $75,000, in the purchase of Wold-Chamberlain Field.

C. F. Keyes, president of the board of taxation, objected to a clause in the contract providing forfeiture of the $90,000 and reversion of the land to the original owners if the interest on the mortgage were overdue six months. No objection to modification of this clause is expected.

Worcester, Mass.

By Henry T. Ford

Nine members of the Worcester Society for the Promotion of Aviation have donated $100 to the club treasury for the purchase of an airplane to be used by club members for pleasure and flying instruction. The members who made the donations are William C. Sylvester, president; Eugene Dudley, Shrewsbury; R. M. Wilder, Worcester; A. B. Witmer, Worcester; Ernest Tetro, Northbridge; J. Karnow, Farnumsville; Thomas Flynt, Shrewsbury; John Morely, and Albert Jones, Worcester.

The club is planning for a social and dancing party as a means of raising additional funds for the purchase of a plane. Dr. Reginald P. MacKinnon, a former member of the Royal Canadian Flying Corps during the war, spoke at a recent meeting of the society.

The placing of air mail boxes in the business section of Worcester has increased the amount of mail sent by that route but not enough to warrant a stop of the New York-Boston planes as they pass over this city. The chamber of commerce is actively interested in having the air mail make a stop at Whittall Field and Roscoe H. Goddard, secretary, and Frank H. Coleworthy will make a trip to Washington to interview post office officials.

Boston, Mass.

By Daniel Rochford

Boston figured in the Bremen affair with credit, despite the radio complaints of a New York cameraman who failed to hire a Boston plane for a Canada trip. Pilot Howard Stark of Colonial took his own Stinson-Detroiter cabin biplane and flew to Murray Bay and brought back the first movies which Duke Schiller flew down from Greenely. Stark flew non-stop to Curtiss Field, N. Y. He bought a pump such as is used to bail boats with, attached a rubber hose to it and to a copper pipe leading up to his center wing section gas tank. Then by emptying 10 gal. tanks of gas via the pump into the wing tank he was able to make the long non-stop flight and have gas enough left to take him from New York back to Hartford, Conn.

Record Air Mail Week

Pilot Richard Mackie of Colonial had the mail run all to himself during Stark's absence in Canada, and made a record week of it by completing all trips on time or ahead of time. Weather conditions of course permitted this. One day a favoring tail wind put him over the 220 mi. run in his Pitcairn Mailwing in 85 min., the present record. That same week he broke the air mail volume record for a week day with a load of 80 lb. 13 oz. out of Boston.

Announcements are expected soon by Edward T. O'Toole of the first resident flying school course in New England, to be operated on Martha's Vineyard this summer. O'Toole is associated with Deputy Sheriff Tom Wilson of Boston in the undertaking, and has a five year lease on a large field on the Vineyard and a large farmhouse which he expects to fit

out as a dormitory. He expects to keep two or three planes and pilots busy there with classes opening about the middle of June.

New airplanes added to Boston's list recently include a Fairchild cabin monoplane delivered to the Dennison Airport and now being piloted by Capt. Albert L. Edson of the Bay State National Guard, two new American Eagles to the Bay State Flying Service at the Boston Airport, two new Travel Airs to the Boston Airport Corp., a new PT for the Army Reserve, and the first of several Alexander Eaglerocks to the Old Colony Airways, Inc., which started operating from Muller Field at Revere recently.

Old Colony has built a small operations office on the turnpike and plans to start work at once on two single plane hangars behind the operations office.

Boston Airport Corp. has opened an evening ground school to be instructed by Daniel C. Sayre, organizer of the corporation and at present an instructor in areonautics at M.I.T. Tuition is $30 for 10 lectures and includes one airplane ride.

The Naval Reserve flying classes started at Squantum the week beginning April 30 with Lieut. Reginald D. Thomas as commander, Lieut. W. C. Green as executive officer, and Lieut. Joseph B. Lynch assisting as instructor. A half dozen reserve ensigns and lieutenants have been ordered to early duty.

Baltimore, Md.

By Harry Rudo

The flagship of the fleet of eight airplanes of the Chesapeake Aircraft Corp. here was recently christened the "Blue Heron" before a large assemblage. It is a four place Fairchild cabin monoplane. The other planes are two passenger Travel Airs. The Fairchild is equipped with a loud speaker so that the pilot may act as "guide". Trips to Gettysburg and other historic places are scheduled.

All of the planes of the Chesapeake Aircraft Corp. are named after waterfowl found in the Chesapeake Bay.

Miss Ida Perry Black used a bottle of genuine champagne for the christening, contrary to all expectations. The first attempt at smashing the bottle, which was ribbon-and-wicker covered, resulted only in a deep dent in the aluminum nose of the plane. A second attempt on the steel propeller was more successful.

Immediately after the christening John A. Hambleton took aloft the Misses Ida Perry Black, Kirby O'Dunne, Charlotte L. Whitely, and Nellie C. Biays as guests. Maj. William D. Tipton then took up Charles F. Goob, chief engineer of Baltimore, Raymond Thompson, Dr. Hugh Young, and Hamilton Owens. Pay passengers were then accepted.

The season of the Air Corps of the Maryland National Guard has begun with an assortment of the latest type of planes such as it has never enjoyed before. All were but recently received, three being of the O-11 type, two PT-1's, and two TW's. Two planes of the PT-3 type will be received before the summer encampment.

Clarence Chamberlin quite unexpectedly stopped in at Baltimore recently. He was the guest at a dinner tendered by A. T. Carozza.

Langdon, N. D.

By Walter Ramage

This town has now secured a landing field through the cooperation of its citizens. At present there are two planes at the field doing passenger work and teaching a number of flying students. Pilot Skinner has been flying all winter.

Dr. Stromberg of this town has found the airplane a safe and quick way to make his calls, especially so when roads are nearly impassable as they are at times during the winter.

The Langdon Airport extends an invitation to visiting airmen and aircraft salesmen.

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THE NAVY DEPARTMENT

hereby invites and will receive until 12 o'clock noon, Thursday, August 9th, 1928:

(One) Competitive designs for a rigid airship of approximately 6,000,000 cubic feet volume. Designs to be submitted in accordance with section 10, A to H inclusive, of the Aircraft Procurement Act approved July 2, 1926 (44 stat., part 2, page 780). Price for designs and bid for constructor of one and of two rigid airships to be submitted in accordance therewith as provided in subsequences A, B, and E, of Section 10 of said Act;

(Two) Bids for one and for two experimental rigid airships of approximately 6,000,000 cubic feet volume, parts and accessories; and

(Three) Proposals for construction of one and of two rigid airships in accordance with Navy Department's specifications.

Circulars giving full detailed information may be had on application to the Navy Department, Bureau of Aeronautics. Curtis D. Wilbur, Secretary of the Navy, April 18, 1928.

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U.S. Air Forces

Assign Officers to Tactical School

Orders were recently received by the following named Air Corps officers relieving them from duty at the specified stations and directing them to Langley Field, Va. The men will study in the tactical school at this station.

Maj. Frank D. Lackland, Fort Crockett, Tex.
Maj. Thomas G. Lanphier, Selfridge Field, Mich.
Maj. Norman W. Peek, District Procurement Office, Akron, O.
Maj. Augustine W. Robins, Fairfield Air Depot.
Maj. Jacob H. Rudolph, Wright Field, Dayton, O.
Capt. Earl H. DeFord, Middletown Air Depot, Penna.
Capt. Vincent B. Dixon, Selfridge Field, Mich.
Capt. Oliver S. Ferson, Wright Field, Dayton, O.
Capt. Carl W. Connell, Langley Field, Va.
Capt. Roger S. McCullough, Langley Field, Va.
1st Lieut. Kenneth N. Walker, Langley Field, Va.
Capt. Ross F. Cole, Infantry School, Fort Benning, Ga.
Capt. Douglas Johnston, Coast Artillery School, Fort Monroe, Va.

Improvements Voted for Army Air Fields

The House of Representatives recently passed the James Bill authorizing an appropriation of $6,499,500 to be used in building projects and general improvements at Army posts and aviation fields. Programs for new structures and equipment at the following stations have been approved.

Albrook Field, Canal Zone; France Field, Canal Zone; Wheeler Field, Hawaii; Bolling Field, District of Columbia; Chanute Field, Ill.; Crissy Field, Calif.; Duncan Field, Tex.; Fairfield Air Depot, O.; Fort Sam Houston, Tex.; Marshall Field, Kan.; Maxwell Field, Ala.; Mitchel Field, N. Y.; Post Field, Okla.; Rockwell Field, Calif.; Rockwell Air Depot, Calif.; San Antonio Primary Training School, Tex.; Selfridge Field, Mich.

Air Corps Engaging in Battle Tactics

Sham air-attack battles to demonstrate the striking force of present pursuit and attack planes operating against infantry, artillery, and cavalry under simulated war conditions are being staged by the Army Air Corps this month at six Army stations and tactical schools. The demonstrations are under the command of Brig. Gen. Benjamin D. Foulois, assistant chief of the Air Corps. His staff is headed by Maj. Carl Spatz, who will be in charge of operations.

The demonstrations have already been held at Langley Field, Va.; the Artillery School, Fort Bragg, N. C.; and at the Infantry School, Fort Benning, Ga. They are yet to be held at the Artillery School, Fort Sill, Okla., May 15-17; Cavalry School, Fort Riley, Kan., May 17-20; and at the General Service School, Fort Leavenworth, Kan., May 20-23.

New Radio Beacon at Wright Field

Work has been started on the construction of a new radio beacon station at Wright Field, Dayton, O. The beacon station is being erected on the summit of a low-lying hill to the east of the new Materiel Division laboratories. It will take the place of the old station at the Fairfield Air Depot which is to be dismantled.

Handley-Page Speaks on Slotted Wing

Frederick Handley-Page, British slotted wing device inventor visiting this country, recently delivered a talk on his invention before Air Corps officials in Washington. A moving picture reel depicting test flights with the device was shown.

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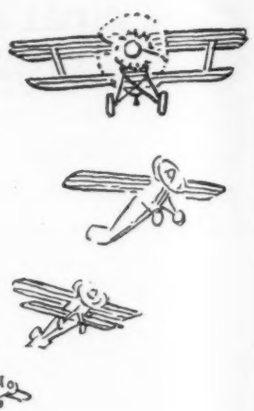

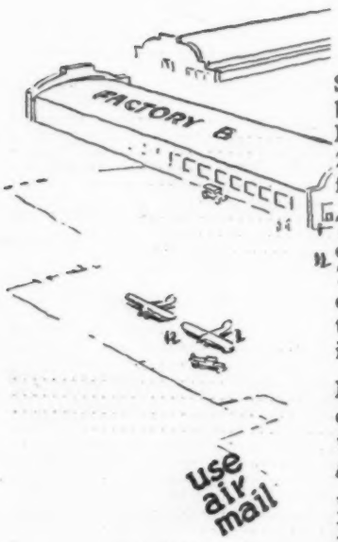

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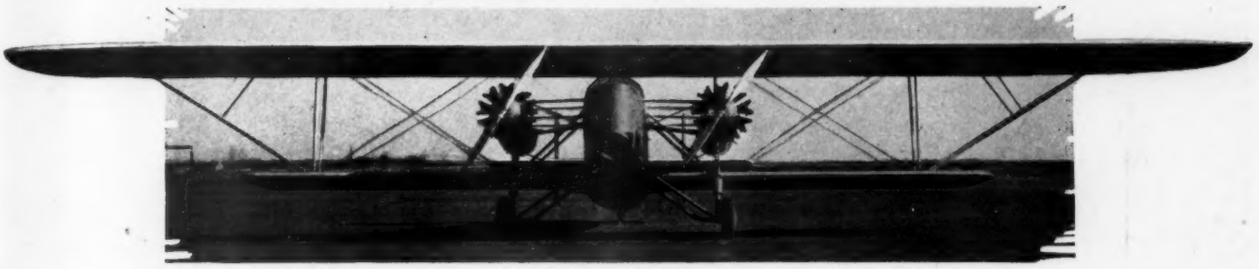

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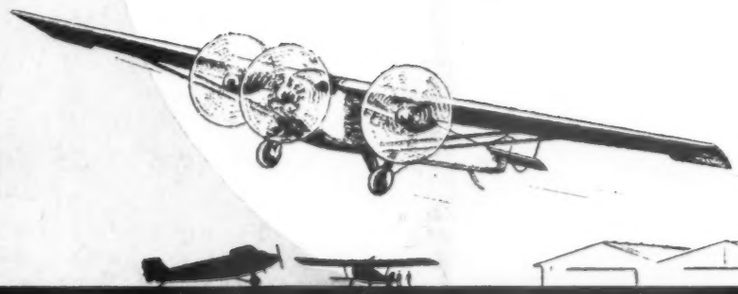

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